

**THE ILLUMINATING ENGINEER**

LIGHT  
LAMPS  
FITTINGS  
AND  
ILLUMINATION  
•

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**Special Public Lighting Number**

This number contains a full account of the Sixth Annual Conference of the Association of Public Lighting Engineers which took place in Bournemouth during September 9th-12th, and a description of the Exhibition of Public Lamps and Lighting Appliances.

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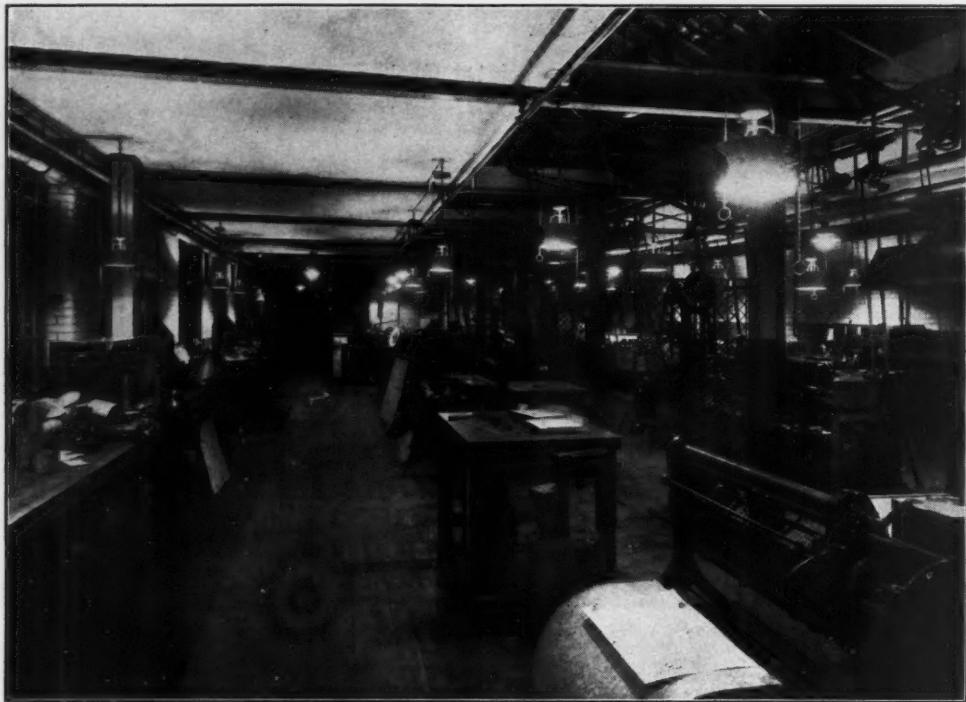
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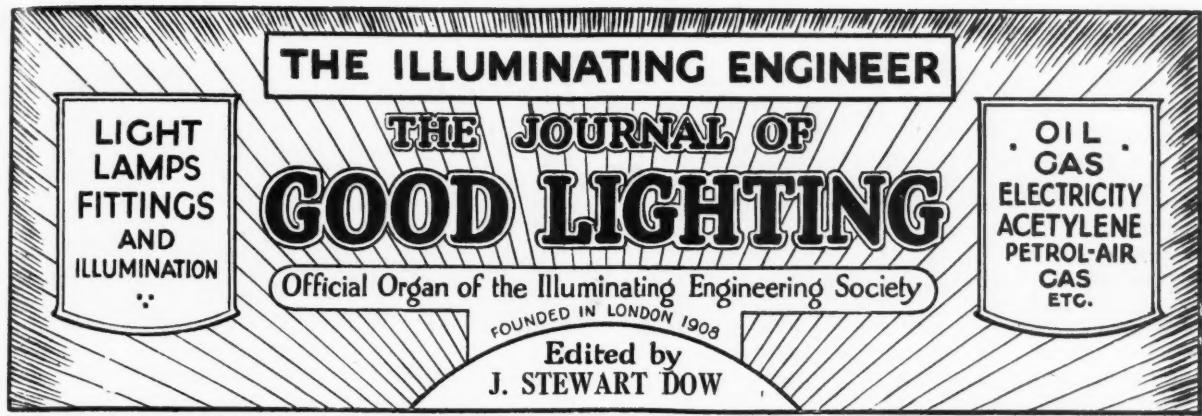
## LIGHTS of LONDON

### 1. *The Machine Shop*

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## Public Lighting

In accordance with our usual custom we are including in this issue an account of the proceedings at the Annual Conference and Exhibition of the Association of Public Lighting Engineers, which took place in Bournemouth during September 9th to 12th. It will be recalled that last year, owing to the fact of the International Illumination Commission being held in the United States during September, this Conference was held during July. This year the Association reverted to the usual date, and no doubt the 1930 Conference, which is to be held in Leicester, will likewise be held in September. In 1931 the great event of the year will be the holding of the next International Illumination Congress in this country, but we understand that arrangements will probably be made for the Conference of Public Lighting Engineers to be correlated with this event.

The Conference which has just terminated was a useful one. The Exhibition contained much of interest, although naturally there was no technical attraction to equal the display arranged by Mr. Colquhoun in Sheffield last year. Bournemouth proved to be a pleasing site for a congress.

The address of Mr. Langlands, who filled the vacancy in the office of President caused by the loss of Mr. Wright, of Bournemouth, early in the present year, was somewhat brief. The absence of any report of the Council struck one as an omission, and we are glad to hear that this will be remedied next year. We also hope that the suggestion put forward at the present Conference—that an annual report should be prepared summarizing progress in public lighting in the chief cities of this country—will be carried into effect. The Association must have special opportunities of collecting such information from its members, and a record of this kind might show that more is being done in this country than is commonly imagined.

The papers, whilst perhaps not very epoch-making or highly original, contained useful matter for discussion and emphasized various fundamental principles of considerable importance to public lighting engineers. The opening paper by Ex-Baillie James MacDougall contained statistics on expenditure on public lighting in various cities. The variation in expenditure per head of population is somewhat remarkable, and it may be observed that there is at present no scientifically framed standard of what a city should spend. Most of us feel that public authorities should be more generous in their allocations for street lighting, and that more

enterprise might well be shown. But improvement in this respect, as we have often pointed out, is largely a matter of education of ratepayers.

For the moment we may draw attention to two outstanding points—the desirability of establishing a public lighting department under a qualified lighting engineer in all important cities, and the expediency of establishing a special street-lighting rate. Rapid progress in public lighting can hardly be expected if this duty is “lumped in” with a number of others and is passed over to an official whose time is fully occupied in attending to other unrelated tasks.

Of the other papers, that by Messrs. F. J. Colquhoun and E. J. Stewart stands out for the detailed information afforded. It is well that a record of their impressions of street lighting in American cities should be on record. It is somewhat difficult to crystallize these impressions within a small space, but there were several points that may be detached for comment. The United States could probably furnish more examples of exceptionally brilliantly lighted streets than any other country, but there seems to be a tendency to concentrate on one or two mains thoroughfares, so that some cities are not so well lighted throughout as is customary here. More attention seems to be devoted to appearance. The authors speak with admiration of the many highly decorative and pleasing types of units and standards seen in American cities; yet their effect is apt to be spoiled by the incongruous juxtaposition of clusters of unsightly poles, the purpose of which is sometimes obscure. Other noteworthy tendencies in America are the super-illumination of business thoroughfares by private aid, e.g., by special assessment of merchants occupying buildings lining the street, and the “booming” of street lighting, mainly by manufacturers and electric supply undertakings (municipalities themselves apparently do little in this way).

The paper suggests lessons for both countries. We believe that in this country the general level of lighting in many cities is better than is usual abroad. On the other hand authorities are apt to be niggardly when the lighting of an important thoroughfare is in question, and to consent only to the most economical and efficient methods, paying too little attention to appearance and effect. In many of our seaside towns also—Bournemouth was mentioned as an example—there should be opportunities for diffusing units, mounted on posts of simple but graceful design, such as are prevalent in

America. Again, whilst we admit that the kindling of public interest in street lighting is "some job," and that the education of ratepayers to demand higher standards and accept the expenditure involved is a slow and, in its first stages, apparently unprofitable process, we still think that much more might be done in this direction. Instances of "parade lighting" met by private expenditure exist in this country. Yet the American plan of inviting assistance from business firms for the lighting of commercial thoroughfares might be much further developed here. This plan of campaign is the more hopeful because it appeals to a business interest—one of the most powerful of motives. The method should, however, be framed to meet and comply with traditional usage. Even if installed partly by private aid, lighting of this kind should still come under the supervision of the local authority, which is the guardian of the public interest.

This leads us to refer to the final paper of the Conference, by Mr. J. S. Dow, who pointed out the inherent difficulties of street lighting by isolated sources far apart, and discussed the value of the supplementary diffused illumination received from show windows, floodlighting, etc. Local authorities should now be led to understand that adequate public lighting is almost impossible unless closer spacing of lighting units is adopted. The ingenuity shown by designers of lighting fittings in combating these difficulties has been considerable, but there is no escape from the dilemma. Approximately uniform illumination between posts at intervals of 100 feet or more, and a high minimum illumination for a given consumption of gas or electricity, can only be obtained by acquiescing in some degree of glare. The glare from a powerful beam at angles slightly below the horizontal is accentuated by the abnormal dark-adapted condition of the eye, and is much more distracting and troublesome than is commonly imagined. The tendency in Continental street lighting has recently been strongly towards suppression of glare, even at the expense of uniformity of illumination. The obvious remedy is closer spacing and the adoption of methods resembling those in Cologne, where units equipped with a protective band, centrally mounted with a spacing ratio of only 3 : 1, have recently been adopted. But adequate street lighting involves more than this. In order to secure comfortable vision it is necessary that objects should be illuminated by diffused light, as in interiors, and that the great contrast between the light source and its sombre background should be alleviated.

This can be effected in some degree by the use of diffusing lanterns, which will become more widely used in the future. Alleviation is also afforded by the use of light-coloured surfaces for roadways and exteriors of buildings, and by the encouragement of supplementary show-window lighting, floodlighting, illuminated signs and architectural lighting. The degree of diffused illumination obtainable in this way may be very considerable, though it is hardly likely to attain the intensity characteristic of Broadway, New York—where it is stated that on one occasion the public lamps were left unlighted without the public becoming aware of it! At present such lighting is chiefly in private hands, but authorities may themselves make fuller use of it in the future. Meantime they might encourage its development by removing obsolete and troublesome regulations and substituting requirements which would check any tendency to glare and unsightly effect. These problems, like the provision of illuminated names for streets or numbers for private houses, may well come within the province of the public lighting engineer, who may ultimately be called upon to exercise a comprehensive survey of the lighting of his city in its entirety.

## Traffic Control by Light Signals

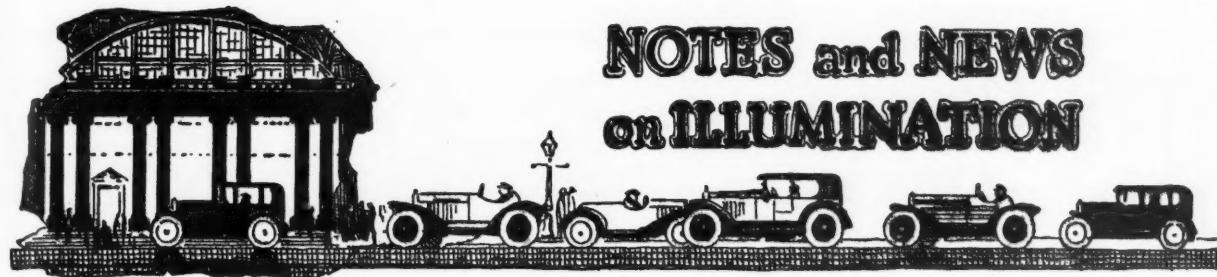
**A** MEMORANDUM on the above subject (No. 297-Roads) issued by the Ministry of Transport, which has been drawn up after consultation with a conference of Chief Officers of Police representing most of the cities and towns in this country, should serve as a useful guide to the installation of luminous signals for traffic control. Traffic signals may be installed to control the traffic at an isolated street intersection or at a series of intersections with the object of increasing the safety of vehicles and pedestrians and promoting easier and more regular flow of traffic. In many cases the use of automatic signals has proved useful in this respect. But the Memorandum lays stress on the need for a careful preliminary study of the area concerned, especially in regard to the volume and nature of the traffic flow and its degree of regularity. For the best results the traffic should be as nearly uniform as possible.

Signals may be of the one-way, two-way, three-way or four-way type according to the number of directions from which they should be visible. The colours should be displayed vertically, i.e., red at the top, amber in the middle, and green at the bottom. The red lens should bear the letters STOP and the green lens the letters GO. The amber lens, which is used to indicate that a change from red to green or green to red is imminent, should bear no lettering. Amber may be shown concurrently with red in order to warn drivers to get ready to move, although actual motion should not take place until the amber and red have been replaced by green.

These arrangements are in conformity with those adopted in other countries. The Memorandum however, specified other details, such as a visible diameter for signal-lenses of not less than eight inches, an illuminating lamp of 60-watt capacity, light distribution over a horizontal arc of 90° and vertically below the horizontal to the eye-level of a driver near to the signal. Careful design is necessary to eliminate phantom images due to reflection, and the signal lights should be plainly visible in bright sunlight at a distance of 300 feet.

Directions are also given on such matters as the direction of beams, height of signals (normally 7-10 ft. above pavement level) and visibility of standards. White lines will be necessary on the roadway to indicate the stopping place for vehicles. The time occupied by the cycle of operations is of importance; the selection should be made after a careful study of local traffic conditions, but 40-80 seconds is a usual period. Pedestrians should be encouraged to cross the roadway at the places where signals are erected, and no other. It is suggested that a warning signal (a sketch of which is included in the Memorandum) should be placed on the main approaches to an area where signals are in use. An interesting item is the recommendation that all coloured lights and coloured objects capable of reflecting light which might be mistaken for signals should be removed from their vicinity. Here we see another instance of the public welfare demanding some degree of supervision of private lighting.

The Memorandum is a timely one which should be studied by all interested in the use of luminous traffic signals and should help towards uniformity of procedure. An opportunity for the discussion of some of these points will doubtless be presented at the forthcoming Public Works, Roads and Transport Congress, when we understand that a paper on luminous traffic signs is to be presented by Mr. W. J. Jones. We also observe that Traffic Control Signals will form the subject of a paper to be read before the Illuminating Engineering Society during the coming session.



## NOTES and NEWS on ILLUMINATION

### The Illuminating Engineering Society (Founded in London, 1909.)

#### PROVISIONAL PROGRAMME OF MEETINGS FOR SESSION 1929-1930.

In what follows we give the provisional programme of meetings of the Illuminating Engineering Society for the coming season, which has now been circulated amongst members:—

##### ORDINARY MEETINGS.

1929.  
Oct. 8th. Opening Meeting (devoted to Reports of Progress, Exhibits, etc.).  
Nov. 8th. Paper entitled "Modern Incandescent Lighting in Kinema Studios," by Messrs. W. H. Villiers and S. G. Double.  
Dec. 10th. A Paper by Mr. W. S. Stiles (Nat. Phys. Laboratory), dealing with the Nature and Effects of Glare, illustrated by demonstrations.  
1930.  
Jan. 21st. A Paper by Mr. Harold C. Ridge, dealing with Stage Lighting, illustrated by demonstrations.  
Feb. 18th. A General Discussion on "Problems in Illuminating Engineering."  
Mar. 18th. A Paper on "The Lighting of a Large Liner."  
April 8th. A Paper by Mr. S. Anderson, B.Sc., dealing with Textile Lighting.  
May 6th. A Paper by Mr. T. Austin, dealing with Luminous Traffic Signals.  
June 3rd. Annual Meeting.

Unless otherwise announced, meetings will be held at 7 p.m., and will be preceded by light refreshments at 6.30 p.m. The programme includes an attractive and varied series of events, and we understand that these may be supplemented by additional informal meetings and visits, of which details will be announced in due course.

We should like to call attention to the Opening Meeting, which will be held in the lecture theatre of the E.L.M.A. Lighting Service Bureau, at 6.30 p.m., on Tuesday, October 8th. This opening meeting will, as usual, be devoted to a report of progress and the exhibit of lamps, appliances and instruments illustrating progress in illuminating engineering. Members who are desirous of arranging exhibits are invited to communicate with the Hon. Secretary (Mr. J. S. Dow, 32, Victoria Street, London, S.W.1).

##### PROVINCIAL MEETINGS.

The Society is also repeating the successful experiment of last year, when additional meetings were held in a number of leading cities in the north of England and Scotland. A meeting has been arranged to take place in the Assembly Hall, at the Chamber of Commerce, Birmingham, at 7 p.m., on October 22nd, when Mr. Waldo Maitland will present a paper on "Architectural Lighting." Mr. C. C. Paterson, O.B.E., will preside.

We understand that there is a prospect of another meeting being arranged in Birmingham early in 1930, and that gatherings in other centres are contemplated. The Hon. Secretary will be pleased to send tickets to any members or friends who would like to attend the meeting in Birmingham on October 22nd, and it is hoped that those who have connections in that city will do their best to make it widely known.

### Street Lighting in Liverpool

From the annual report prepared by Mr. P. J. Robinson, the City Lighting Engineer, it is evident that Liverpool, in common with most other great cities, is continually extending its area. 622 miles of streets

were lighted in 1928-29, as compared with the previous year. Nearly 15 miles of streets have been added to the city area through the Corporation taking over Croxteth, though only three miles have so far been lighted, partly by gas and partly by oil lamps. At the date of the report 174 miles of streets were lighted with electricity, 445 with gas, and three with oil lamps. There are still in use 70 oil lamps, furnished in roads where at present neither gas nor electricity mains exist. The number of electric lamps in use has increased from 8,555 to 9,766, a feature being the increase in the number of 150-watt lamps, which seem to be the most widely used, having replaced the 100-watt type in many streets. The number of gas lamps (17,622, as compared with 17,782) has somewhat decreased, but the decrease is more apparent than real, as the number of burners is greater, 24,373, as compared with 22,034. This increase is evidently due to the introduction of four-light fittings, of which 755 were in use, as compared with 300 in the previous year. The provision of signal lamps at important crossings has been receiving attention, and a lamp of a rotary character, flashing at intervals, has been designed. Nine such lamps have been fixed at important junctions, and have proved of considerable assistance to the police. A number of street refuges have also been constructed and illuminated.

### A Portable Showroom

We recall that some time ago we referred to the enterprising action of a gas company in the North of England in establishing a travelling showroom. According to *Electrical Industries*, an electrical exhibit of a similar character was shown by the South Wales Power Co. at Cardiff last month. This takes the form of a travelling electrical exhibit fitted in a caravan, measuring inside about 15 ft. by 7 ft., and 7 ft. 3 in. high, and running on solid rubber tyres. All four sides of the caravan open, enabling its contents to be displayed. Wiring for lighting is provided in the roof by means of adjustable battens, one of which holds 12 shop-window fittings, with three switches controlling different colours, whilst the centre batten holds a selection of fancy shades. In addition to the lighting apparatus, other domestic applications of electricity can be demonstrated in this open caravan, amongst which is mentioned an electrical "Farmer's Boy," a portable machine enabling one motor to be readily moved from place to place and used for a variety of operations about the farm.

### The Late Baron von Welsbach

We notice in *The Gas World* a brief summary by Capt. W. J. Liberty of the work of the late Baron von Welsbach, whose name will be for all time associated with the development of gas lighting. It was in 1884 that Welsbach (then Dr. Karl Auer) made his discovery of the incandescence of fabrics impregnated with certain salts. The first mantles, composed of oxides of zirconium, lanthanum and yttrium, were not very successful, owing to their poor luminosity and fragile nature. It was not until 1893 that Welsbach announced his discovery of the remarkable incandescence obtainable from a mixture of 99 per cent. of thorium oxide with 1 per cent. of cerium oxide. This discovery, in conjunction with the Bunsen burner, revolutionized gas lighting. Capt. Liberty recalls his experience of the first mantle brought to him for inspection in the City of London. On the day after it was fixed over the desk he found a little heap of dust on the blotting pad! Subsequent mantles, however, proved more durable, though still a long way from the finished product of to-day.



## A Show-Window Competition in Milan

In a recent issue of the *Transactions* of the Illuminating Engineering Society (U.S.A.), we find an account of a show-window lighting campaign recently initiated in Milan. A report issued on the subject by the A.N.S.I. of that city is stated to contain the most complete description of the procedure of organizing and conducting a show-window lighting competition that has ever appeared. A feature was the interest taken in the project by the Mayor and the municipal authorities. A preliminary survey had showed that fully 60 per cent. of windows in Milan were badly lighted and only 15 per cent. were really well lighted. The windows were divided into six classes, according to nature and size, and prizes were offered for the best effect. Prizes were also offered to the contractors who secured the greatest number of entrants, and who installed the six prize-winning windows. There were 520 entries. The immediate result of the competition was a radical improvement in at least 200 show-windows. A special discount was granted for the increase in electrical consumption during the time of the competition. The average increase in consumption was about 200 kw.-hours per shop per month. If all the shops in Milan (estimated at about 20,000) adopted modernized lighting the potential market would thus amount to about 50 million kw.-hours per year. The report draws attention to several peculiarities in the conditions in Milan. For example, it is difficult to induce the average merchant to keep his window lighted after closing hours. Some shopkeepers hesitated to leave their shops without closing the shutters, even when the lights in the window were turned on. To overcome this unique prejudice the scheme of protecting the windows with screens of wire-netting was adopted in some instances. There was also a widespread objection to the use of valances or curtains to hide the reflectors or light sources from the view of observers in the street. Many small merchants felt that they wanted to public to see that they had spent money on their lighting equipment.

A great grievance in Italy is the taxes imposed by the Government on current used for lighting and on lamps, which makes development work very difficult. During  $\frac{1}{2}$  months of the competition the increase in the lighting tax paid to the Government was 50,000 lire (over £500). Those visualizing possible improvements go to the public saddled with the difficulty that their programme would involve an increase in the lighting tax of 27 million lire (about £270,000) which would have to be paid by the merchant community of Milan. A strong plea for a more liberal policy in regard to lighting taxation is being made.

## The Invention of the Electric Incandescent Lamp

Although in this country Swan is rightly regarded as the originator of the electric incandescent lamp in a practical shape, one hears from time to time remarkable instances of early efforts by inventors in this field. We notice in *Licht und Lampe* a reference to the fact that Heinrich Gobel apparently produced an evacuated lamp containing a carbon filament, which was shown in action as much as 25 years before the work of Edison and Swan. Gobel's work has now been commemorated by an inscription, illuminated by an electric lamp, which has been erected at his place of birth, and was unveiled by the Hanover Elektrotechnische Verein, on September 14th, the birthday of the inventor.

## Application of Photo-Electric Cells

The use of photo-electric cells in photometry is now a familiar feature, and the possibilities of such devices for the control of street lamps attracted much interest at the recent Conference of the Association of Public Lighting Engineers at Bournemouth. In *L'Electricien* some further examples of the practical applications of these and other light-sensitive devices are mentioned. Among these are the detection of small irregularities in reflecting surfaces which can be studied photoelectrically, and the comparison of coloured materials by the aid of cells equipped with colour filters. Photoelectric cells have been used with success to preserve a record of the amount of smoke passing up a chimney. Such methods depend on the diminution of light by absorption in passing through the smoke column. Another ingenious idea is to make use of light-sensitive apparatus to count the number of objects or persons passing, an impulse being given every time the light from an incandescent lamp is interrupted. A somewhat similar device is applied as a precaution against fire. Automatic devices based on thermal effects are apt to be unduly slow in action, and have certain limitations, but a relay actuated by a photo-electric cell, which gives warning should a blaze of light occur, is said to be very effective.

## Rural Electrification

It is evident that rural electrification is being actively pursued in the United States. According to *The Electrical World*, an agricultural development department, directed by an agricultural engineer, was established by one prominent supply undertaking in 1925 in order to extend the company's service to as many farmers in the territory as possible. The company is now supplying electricity to more than 3,860 farmer customers, and has a well-defined policy for extending service to many more of the 31,000 farms in the territory. During 1928, in order to encourage a wider use of electricity on the farm, and to demonstrate to residents of the city that the comforts of modern utility service can be had in the country, the company established a model farm near Mundelain, Ill. At this farm the uses of gas and electric appliances which minimize labour on the farm and add comforts in the home are demonstrated. Nearly 20,000 people, representing 46 States and eight foreign countries, visited the farm during the five months in 1928 that it was in operation. It is expected that during the summer of 1929 the visitors will considerably exceed that number. Group meetings are frequently held. Farmer organizations from two adjacent counties recently held a meeting, which was attended by more than 3,000 farmers.

## Spectacular Lighting at Barcelona

Some time ago we referred to the efforts that were being made to apply spectacular lighting on a large scale at the International Exhibition in Barcelona. According to a recent note in *The Electrical World*, the lighting load of the exhibition attains the impressive total of 5,232 kw., which is controlled from a central depot. Several views of the grounds of the exhibition, photographed at night, are reproduced. The lighting effects are said to be on an imposing scale, though it would appear from these pictures that the methods employed, including coloured floodlighting and illuminated fountains and cascades, are conceived on lines now fairly familiar.

## TECHNICAL SECTION

COMPRISING

### Transactions of The Illuminating Engineering Society and Special Articles

*The Illuminating Engineering Society is not, as a body, responsible for the opinions expressed by individual authors or speakers.*

## Association of Public Lighting Engineers

### Sixth Annual Conference (held in Bournemouth, September 9th - 12th, 1929)

THE Sixth Annual Meeting and Conference of the Association of Public Lighting Engineers was held in Bournemouth during September 9th—12th, and proved to be a successful gathering. On the evening of the opening day (September 9th) visitors were received at the Town Hall by the Mayor of Bournemouth (Alderman Charles Henry Cartwright, J.P.), who, on the following morning, extended to them a formal welcome. The proceedings were then opened by the induction of the new President, Mr. S. B. Langlands (Public Lighting Engineer to the City of Glasgow) and a diploma was presented to the retiring President, Mr. J. F. Colquhoun. A brief address was delivered by Mr. Langlands reviewing progress during the past year, and alluding to the recognition received by the Association and to the importance of its work.

The first paper, by Ex-Baillie James MacDougall (Glasgow) was entitled "Lighting and Rating." The author traced the various Acts relating to public lighting and presented some tabular data illustrating the expenditure on lighting per head of population in various cities. The importance of the duties of the public lighting engineer was emphasized, and it was suggested that in all cities of importance a special lighting rate should be levied.

Following this address members adjourned for luncheon in the Town Hall, at the invitation of the Chairman and Directors of the Bournemouth Gas and Water Company. On resuming, a paper entitled "Compromise in the use of Illuminant for Public Lighting" was read by Mr. C. H. Woodward (Lighting Superintendent, Bournemouth), in the course of which the author discussed various technical limitations in street lighting and illustrated his remarks by reference to certain problems encountered in the streets of Bournemouth.

On Wednesday, Sept. 11th, the chief item was a joint paper by Messrs. J. F. Colquhoun and E. J. Stewart on "American Practice in Street Lighting." This paper was devoted to a summary of the authors' experiences during their visit to the International Illumination Congress held in the United States last

year. The lighting conditions in a number of American cities were briefly discussed and illustrated by numerous lantern slides, and a summary of the chief conclusions reached in regard to street lighting at meetings of the Congress and at the Sessions of the International Commission on Illumination was given.

The final paper, by Mr. J. S. Dow, was entitled "Private Lighting as an Aid to Public Lighting." The author mentioned certain forms of street lighting that

might be effected by private aid, mentioning especially the lighting of arterial roads and rural highways. He also discussed the part played by illuminated signs, flood lighting and architectural lighting in helping to illuminate thoroughfares. He urged that public lighting engineers should take a wide view of their duties and suggested that ultimately the lighting of a city as a whole might, to a great extent, come under their supervision. This series of papers gave rise to discussion in which a number of visitors to the Conference took part.

The afternoon of Wednesday (September 11th) was set aside specially for the inspection of the Exhibition. Over 20 firms took part in the display, which was a comprehensive one, both gas and electric lighting being represented. (See pp. 258-266.)

In the course of the proceedings an invitation to hold the 1931 Conference in Leicester was conveyed by Alderman Bell, of that city, and was gratefully accepted.

The Conference was concluded by a dinner, held at the Town Hall on the evening of September 11th, when the toast of "The Corporation of Bournemouth" was proposed by Ex-Baillie James MacDougall and responded to by the Mayor of Bournemouth (Alderman Charles Henry Cartwright). Councillor J. C. McKechnie proposed "The Association of Public Lighting Engineers," and the President replied. The final toast of "The Visitors" was proposed by Mr. C. C. Paterson (President, International Commission on Illumination). Mr. Harold E. Copp and Lt.-Col. K. Edgcumbe replied on behalf of the Institutions of Gas and Electrical Engineers.



*By courtesy of the "Gas Journal"*

S. B. LANGLANDS, J.P.,

President of the Association of Public Lighting Engineers;  
Public Lighting Engineer, Glasgow.

## Presidential Address

By S. B. LANGLANDS, J.P.  
(*Public Lighting Engineer, City of Glasgow*).

**I**N his opening remarks Mr. Langlands referred to two losses sustained by the Association during the past year in the deaths of Mr. Dickinson, of Liverpool, and of Mr. Wright, of Bournemouth. He hoped that in subsequent years a regular report of the Council would be submitted. Meantime he was glad to be able to report that the Association, though only six years old, was making good progress, having now 4 Honorary, 104 Ordinary, 35 Junior members and 26 Associates.

The work of the Association had received welcome recognition from kindred associations and public authorities, and its representatives have taken an active part in the preparation of the B.E.S.A. Standard Specification for Street Lighting. The Association had likewise been represented at the International Illumination Congress held in the United States, where excellent work had been done. In this connection Mr. Langlands referred to the fact that the next International Congress on Illumination would be held in this country in 1931. It should be our aim to emulate the wholehearted kindness shown to visitors in the United States, and he hoped that the coming Congress would strengthen still further the bond of international amity. We could show to visitors our lighting outlook, in some respects different to theirs—our staid conception of our lighting duty to each and all of a town's inhabitants—and just because of this difference in outlook the technical intercourse facilitated by the Congress should be extremely valuable.

It might well be asked: "What are the ideals of street lighting in the United Kingdom?" He thought that the standard specification would in itself furnish a good general indication, and would help towards improving the standard of public lighting, but other things were needed if any considerable progress was to be made. He could not conceive any public department being without a well-equipped testing section, if not a complete research laboratory. The laboratory associated with the Lighting Department at Glasgow had proved invaluable, and had saved the city a considerable amount of money. He hoped that a paper on laboratory practice would be included in the programme for next year.

Turning to technical details, Mr. Langlands mentioned that experiments with electrical relays were continuing. He foresaw the time when the lighting and extinguishing of the city lamps would be done from one or two divisional stations, which would resemble an engine room on a ship rather than a muster hall for lamplighters. Later in his address Mr. Langlands referred to the possible application of selenium for the automatic control of public lighting. In providing cables, accessibility and safety were among the chief points which had to be considered. City streets as a burying-ground were becoming overcrowded, and though he had been criticized for not adhering more strongly to the practice of keeping conductors underground he believed that overhead wires had advantages, and that the incidental difficulties could be effectively overcome.

The question of tariffs for gas and electricity might well form a topic for discussion at meetings of the Association. He hoped that the Tariff Committee would consider this aspect and review the possibility of standardizing a rate of one penny per unit for public lighting in cities having a population of 100,000 and upwards. It might be worth while to set up a small committee to watch the interests of the Association in connection with this important matter.

In the final section of his address Mr. Langlands urged the importance of thoroughly efficient maintenance. It was better to furnish 3 thousand effective hours than 15,000 hours which might eventually prove defective. He observed that in the Royal Commissioner's first report on the control of traffic on roads no reference was made to the question of the reflecting power of road surfaces. This was another matter which the Association ought to deal with.

The duties of the street-lighting engineer were increasing daily. In Glasgow the care of police signals, traffic signs and control, and street clocks had already become a part of his duties, and if the proposal to illuminate street-name tablets and street numbers received support, then the number of lighting points would be considerably increased. The public lighting engineer might also be asked to assist in preparing lighting schemes for new public buildings. In many cases work would have to be done in conjunction with other departments. The reflective value of road surfaces could be discussed with city engineers, the visibility of policemen with chief constables, etc.

Novel suggestions in regard to public lighting are constantly being made. Would it not be possible for the Association to have a committee to test and report upon new ideas, which can be tested out in those cities where well-equipped testing stations are available, so that the results would ultimately become accessible to all members?

## Lighting and Rating

By EX-BAILIE JAMES MacDOUGALL

(*Convener, Watching and Lighting Committee, City of Glasgow*).

**I**N introducing his subject the author remarks that by general consent the lighting of streets and roads should be discharged by the civic body. The best procedure is doubtless to establish a department to deal with this work under the supervision of an official responsible to a special committee. This has been the practice in Glasgow since 1843. The Glasgow Police Act of that year authorizes the appointment of an inspector of lighting, and records show the activity of a superintendent of lamps from the beginning of the nineteenth century. The position in Glasgow was further improved by the Glasgow Police Act of 1866, authorizing the appointment of an inspector of lighting and defining his duties as follows:—

"The Inspector of Lighting shall be responsible to the Board for the erection, maintenance and renewal of the said lamps, for the proper maintenance and renewal of any lamps now in use, for keeping in order all such lamps, for lighting them during such hours as the Board may from time to time direct, and generally for the complete state of efficiency of his department."

In Scotland such appointments were carried out under the local Acts, but it is evident that the position in England and Wales was originally quite as favourable for the development of the lighting service, the Act of 1830 (King George IV, c. 27, sec. 33) providing:—

"That it shall be lawful for the said Inspectors and they are hereby empowered from time to time to cause such lamp irons or lamp posts . . . to be fixed upon or against the walls or palisadoes of any houses, tenements, buildings or enclosures . . . or to be erected in such of the said roads, streets and places within the limits of the Act as they shall think proper, and also to cause such number of lamps of such size and sorts to be provided and fixed upon such lamp irons and lamp posts as they think necessary for the lighting of any such roads, streets, or places, and cause the same to be lighted with gas, oil or otherwise for such number of hours in any twenty-four hours as they think necessary."

This Act was repealed by the Lighting and Watching Act of 1833, which imposed penalties on any person wilfully breaking lamps or lamp posts or wilfully extinguishing the lights. It was specified that the expenditure involved per annum should be fixed by the ratepayers.

The Public Health Act of 1875, however, which supersedes the earlier Act so far as urban districts are concerned, dismisses street lighting with a perfunctory statement: "May provide such lamps, lamp posts and other materials and apparatus as they think necessary for lighting same." This seems a retrograde step. It will be agreed that there should be an official specifically appointed to look after a certain service, and the work will then be better done than if it is only one of several duties allocated to another official. In Glasgow,

at any rate, the policy of establishing a lighting department has proved an unqualified success.

At the same time there is a general demand for a reduction in the local rates with the result that, with scarcely an exception, the majority of the cities and towns of Great Britain are simply playing with the question of street lighting. In this connection the author presents a table summarizing the expenditure per head of the population per annum in various cities.

TABLE I Expenditure on public lighting per head of population per annum

City		s. d.
Leeds ..	..	4 4
Glasgow ..	..	4 2
Manchester ..	..	3 6
Newcastle ..	..	3 4
Dundee ..	..	3 4
Liverpool ..	..	2 9
Leicester ..	..	2 7
Edinburgh ..	..	2 5
Aberdeen ..	..	2 4
Sheffield ..	..	2 4
Birmingham ..	..	2 2

It will be seen that cities spent as much as 4s. per head of the population per annum on street lighting, and in a number of cities the amount does not exceed 3s. In America it is considered that no progressive city should be spending less than two dollars (approximately 8s. 4d.) per head per annum on street-lighting service.

In Glasgow, until 1922, the position was that generally prevailing in Scotland, the lighting expenditure being met from the general police rate. In England the expenditure was included in the general district rate under the Public Health Act of 1875, and for rural districts under Section 9 of the Lighting and Watching Act, 1833, already quoted. The Glasgow Confirmation Act of 1914 gave power to levy a lighting rate not exceeding 6d. in the £, and this had to cover all expenditure for street and stair lighting. With well over 80,000 stair lights this proved quite inadequate in 1923, when the rate was increased to 9d. The lighting rate for the year 1927-28 was 8.97d.

In Table II some additional statistics are given:—

TABLE II Product of Rateable Value and in £

City	Population	Rateable Value	per Head	Rate	Total Rates
Glasgow ..	1,034,174	11,599,163	11 4 3	43,000	14/0/3
Birmingham ..	955,300	6,689,011	7 0 0	25,472	14/6
Bradford ..	293,200	2,548,035	8 13 10	9,856	14/2
Leeds ..	483,952	3,386,257	6 19 11	13,234	15/8
Leicester ..	245,000	1,504,000	6 2 10	5,858	14/11
Liverpool ..	875,900	7,246,549	8 6 0	25,423	14/9
Manchester ..	751,900	7,015,912	9 6 7	27,300	13/4
Newcastle ..	288,500	2,449,923	8 9 10	9,508	12/5
Sheffield ..	524,900	2,620,155	4 19 10	9,872	18/8

Glasgow stands well ahead in rateable value, which amounts to £11 4s. 3d. per head of population. Sheffield, on the other hand, comes lowest on the list, the value per head being slightly under £5.

The figures show the need for some system of uniform assessment procedure. Bradford, with a population of 293,200, has a rateable value of £2,548,035, while Sheffield, with nearly double the population, has practically the same rateable value. Evidently there is room for legislation providing for the establishment of sound and accurate standards throughout the State. The first and most necessary step seems to be to secure a special lighting rate. Apparently practically all expenditure for public lighting in the United Kingdom is met from assessments, but in America the practice of defraying either the installation or maintenance costs of public lighting partly by contributions from commercial concerns which benefit from the improved illumination is quite usual.

The expenditure of any lighting department shows three outstanding items—labour, gas and electricity. Automatic lighting methods, whilst effecting some saving, do not seem likely to make a very great difference in the total expenditure. A more important item is the charge for gas or electricity and the cost of lighting appliances. The author remarks upon the variation in prices of gas. The fact that prices for a definite

service, such as street-lighting prices, range from 11d. per 1,000 in Sheffield to 2s. 4d. per 1,000 in Glasgow, suggests that here we have a splendid field for the operations of the B.C.G.A.

In this connection the author remarks:—

"I feel hopeful that on this hand the lighting engineer may look for some assistance. I hardly think that so enterprising an industry will merely look on while the twin service, electricity assisted, I grant you—by State funds—moves forward under the direction of the Electricity Commissioners to offer for street-lighting purposes at least the tempting price of ½d. per unit, a decided improvement on the 1½d. presently being paid by Glasgow." But as the gas industry cannot afford to ignore the mantle question so the electrical industry must see to it that the price of lamps does not prove a stumbling-block."

In conclusion attention was drawn to the difference in the price of lamps prevailing in the United States and in this country, and hopes of a further reduction in prices were expressed.

## Compromise of the Use of Illuminants for Public Lighting

By C. H. WOODWARD

(Public Lighting Superintendent, County Borough of Bournemouth).

COMPROMISE appears in two chief forms: compromise in policy and technical compromise. The lighting engineer can never run a clear course free from either of these encumbrances. One of the first examples of compromise given by Mr. Woodward was the failure to imitate daylight with any precision. It is sometimes said that the lighting of certain areas is "equal to daylight"; actually, however, the "tunnel effect" of the concentrated light from a few artificial sources is very different from the unrestricted illumination from the overhead sky. In this connection Mr. Woodward referred to the mounting of three lights on a mast about 70 feet high at the pier approach at Bournemouth, which furnishes an extensive area of fairly uniform illumination. For ordinary street lighting, however, one has to shorten the height and to increase the number of posts, thus largely sacrificing horizontal illumination and substituting vertical illumination together with reflected light from buildings, etc. One result is to give an effect similar to that obtained from a motor-car headlight, which shows up all objects in "silhouette," and is also liable to accentuate the appearance of a broken road surface. The compromise can, however, be alleviated by the use of suitable reflectors and by means of refracting glassware. In the case of gas lighting difficulty is experienced in directional control. In this connection the author suggested several devices which might aid in promoting better distribution of light.

Turning to maintenance problems, the author remarked that it is usually considered necessary to protect high-wattage gasfilled electric lamps with an outer globe. This, he thought, was not strictly necessary. He had had fifty 500-watt gasfilled lamps in use since 1919 without any protection whatever, and exposed to rain and wind-driven spray on the sea front, but had not had one failure which could be attributed to this treatment. An interesting experiment to illustrate the "drawing effect" of light was next described. The author obtained a record, by means of a camera stationed above the Undercliffe Drive, of the course of a car driven by a friend along this thoroughfare. The wavy line, indicating the course of the headlight, shows that brightly lighted areas gave the driver confidence to keep in the middle of the road, whilst dark patches caused him involuntarily to seek protection of the curb.

Compromise between lighting and decorative effects is often necessary. From the decorative standpoint it is often desired to turn a wide thoroughfare into a shady avenue, and in Bournemouth there are few roads devoid of trees. Needless to say that this accentuates the difficulties of the public lighting engineer. The author himself rather deplored the tendency to brilliant

ceilings and bright general lighting in interior lighting. He preferred the old method of adopting well-shaded fittings throwing certain objects into relief. Similarly, he thought there was room for artistry in street lighting to achieve a somewhat more pleasing effect without sacrificing the efficiency from the traffic standpoint. In other respects decorative treatment resolves itself into a compromise. Thus one has, on the one hand, the uncompromisingly plain tubular posts which hold a plain undecorated lamp at its summit; on the other hand, one sees supports decorated with dolphins, mermaids, etc., and crowned with a massive filigree dome with several bracket or pendent lights. An intelligent compromise in the design of street standards is necessary. Mr. Woodward suggested that more use might be made in such designs of the coat-of-arms of a town, which showed individuality and would incidentally mark the transition of one boundary to another.

In conclusion, the author pointed out that the man in the street unconsciously makes a compromise when making use of the illuminants provided. In watching a person travelling from the position immediately under the lamp to the point midway between two of them one observes a gradual change from full illumination to silhouette. Near the lamp one can distinguish the colour of the clothing and the features, but as the distance from the lamp increases the figure is observed only as silhouette against the illuminated background. By artificial light the eye is constantly fluctuating between these two methods of vision, "positive" illumination and "negative" silhouette. During daylight one sees things entirely by the positive method, and it is only noticeable that the contrasts in brightness are usually very much less than those which occur in artificial light. This suggests a possible classification of public lighting in terms of the percentage of positive and negative effect.

Bearing in mind these circumstances, the lighting engineer should devote attention not only to the lighting units but to the surfaces on which its light falls. Every opportunity should be taken of co-operating with road authorities with a view to encouraging the use of road materials giving a better reflection factor. Co-operation of this kind might help to restore the "seeing faculty" associated with the old lighter roadways, which have suffered since the general use of tar and bitumen products.

## American Practice in Public Lighting

By J. F. COLQUHOUN

(*Lighting Engineer, City of Sheffield*), and

E. J. STEWART

(*Public Lighting Department, City of Glasgow*).

**T**HIS paper consisted mainly of a review of street lighting in the cities in the United States visited by the British delegates to the International Illumination Congress last year. The conditions in New York, Boston, Lynn, Philadelphia, Washington, Cleveland, Detroit, Chicago, Niagara Falls, Toronto and Montreal were described and illustrated by lantern slides. In New York a noteworthy feature is the effect of the illuminated signs on Broadway. It is stated that the public lamps in this street were once accidentally left unlighted and no one noticed the omission! In outlying areas, however, the illumination was relatively poor. Magnetite arcs are widely used and white glassware is largely employed in the better-class New York streets, where there was relatively little glare. The chief fault appeared to be excessive spacing. The arrangement for traffic control by luminous signals is very complete in New York, in the centre of which headlights on cars are prohibited. Attention is drawn to the pleasing granite aggregate standards, terminating in a spherical opal globe; these are frequently found in parks in the United States.

### PUBLIC LIGHTING IN SOME AMERICAN CITIES.

In Boston the lighting arrangements generally resembled those in New York, but the spacing was some-

what better—though, owing to the great width of many of the streets, there was sometimes difficulty in adequately illuminating the entire area. A typical arrangement utilized magnetite arcs or gasfilled (750-w.) lamps in urn-shaped opal or rippled glass lanterns; these gave beautifully diffused lighting, though the current consumption seemed high in relation to the degree of visibility obtained. The ornamental lantern was in evidence in almost all American cities, but harmony of the street as a whole was only occasionally found, and in many cases the effect was apt to be spoiled by adjacent unsightly obstructions.

Lynn, the next city visited, has at its entrance a sign bearing the description "Best Lighted City in the World." Here again urn shaped globes of rippled glass were in use; also asymmetric dome refractors in alabaster rippled globes, a common combination in America. Somewhat similar methods were adopted in Philadelphia, where some of the streets are lighted by gas (upright mantles in a clear glass chimney, with a refractory cylinder above). Street lighting by gas was almost absent in American cities, and inverted mantles were rarely seen.

Washington was noteworthy for the general pleasing effect. There was an absence of the thick overhead cables and excrescences visible elsewhere, and the standards and fittings were in common harmony. The floodlighting of the dome of the Capitol was one of the most satisfying installations seen.

Cleveland was remarkable for its brilliant lighting, 10,000 to 15,000-lumen units being mounted in some streets, whilst near the new Union Terminal building there are ornamental standards bearing 25,000-lumen lamps in large ornamental globes. In Superior Avenue the use of 2,500-lumen lamps, with 100ft. spacing, involves a very high consumption per linear foot. The cost of lighting the best classes of streets in Cleveland was stated to be as much as £2,000 per mile per annum! A visit was paid to Nela Park, the research centre of the National Electric Light Association, and to the 2,000-feet stretch of road used for demonstration purposes. Here many different types of lighting may be seen in operation, though the authors express the opinion that the demonstrations in Sheffield last year led to even better results, owing to the greater variety of the conditions under which lamps could be seen.

Washington Boulevard, in Detroit, is famous for the expenditure of more energy per linear foot than in any other city in the world. With 5-kw. per post it beats even State Street, Chicago. The appearance of this boulevard, though expensively obtained at 92.6 watts per linear foot, was certainly imposing. The local estate paid for the installation. Some main roads are stated to be lighted for 30 to 40 miles outside Detroit.

The lighting of State Street, in Chicago, has been several times described. In spite of the provision of 4,000 watts per post, usually spaced at 100 feet, vision was by silhouette beyond the second post. The cost of the installation, about £286 per post, was paid by the State Street merchants—except that the city pays a share equivalent to the cost of the original installation which it displaced. The wide boulevard leading to the University is lighted by concrete pillars 14 ft. high, carrying spherical globes. The effect was very pleasing. Similar fittings are largely used in Chicago parks.

Of all the cities visited Toronto came nearest to the author's idea of street lighting. The municipality took the lead in all improvements, and the lighting of all streets was considered. It was recognized that in some streets better lighting was desirable, and the city is carrying out a continuous programme of improvement. The annual cost of the lighting was stated to be about 500,000 dollars.

### THE INTERNATIONAL ILLUMINATION CONGRESS.

At the Convention of the American Illuminating Engineering Society, which was held in Toronto, a number of papers bearing on street lighting were read. Two resolutions have been passed by the Society's Committee on Street Lighting, (1) urging the economical advantage of using lamps of at least 1,000 lumens, and

preferably of 2,500 lumens or more, and (2) asserting the feasibility of lighting important traffic thoroughfares in such a manner as to render the use of powerful headlights unnecessary. For this purpose a value of 100 lumens per linear foot of street is considered adequate.

Reference is next made to the proceedings at the I.C.I. sessions, held at Saranac Inn. The British Standard Specification for Street Lighting has excited much discussion. The chief difference in opinion centred on the use of minimum horizontal illumination in the British Specification. In other countries average illumination is adopted, and in the United States there are some who prefer to work in terms of lumens, provided per linear foot of street. The resolutions finally adopted proposed that both the average horizontal illumination and the minimum horizontal illumination on the roadway should be specified. Recommendations were also made relating to the study of the plane of measurement, the type of photometer, the practical determination of glare and visibility, the consumption of gas or electricity, and the generated luminous flux per unit of surface on any length of highway; and the collection of information generally representative of modern practice. A further resolution was adopted recommending the formation of a Committee to study luminous traffic-control signals and their uses.

#### LESSONS LEARNED IN AMERICA.

In the final section of the paper the authors indicate some of the chief lessons learned in America. The only satisfactory street lighting is by lamps of high candle-power mounted sufficiently high and spaced reasonably close together. Bad lighting in America was mainly due to excessive spacing and insufficient height. Street lighting ought to be kept under the control of the local authority, at any rate in Britain. The lighting of the streets of a town should be graded according to their importance, but all should be lighted well. In this country we have not the superlighting of some American main streets; but, on the whole, we tend to pay more attention to side streets. In America there is a tendency to emphasize the lighting of relatively few "show streets" which serve as an advertisement.

Yet a distinction should be drawn between practice and principles. There is much sound advice in the recommendations of the American Illuminating Engineering Society, which recommends an average horizontal illumination of 0.25 foot-candle as the minimum for thoroughfares (corresponding to 0.25 foot-candle, 50 to 100 lumens per linear foot), and an average of 0.05 foot-candle for residence streets (corresponding to 10 lumens per linear foot). Lamps of less than 100 watts are rarely seen in American cities. Lamps of at least 1,000 lumens, and preferably more, are recommended, the mounting height not to be less than 15 ft. In many instances glare seemed to be materially reduced by the use of diffusing glassware, though even these units are capable of glaring effect if mounted at, say, 15 ft.

Street lighting in America seems to be considered more from the artistic than the scientific standpoint. Considerable importance is attached to appearance by daylight. In many streets efficiency seems to have suffered, yet the use of definitely decorative fittings of simple outline could with advantage be extended in this country, especially in towns which are themselves beautiful, such as Bournemouth. The provision of special cables for street lighting and the use of remote or centralized control seemed to be more usual in America than in Great Britain. The cheapness of electric lamps, as compared with prices ruling in this country, made it possible to use larger sizes. The explanation of this difference was the subject of some discussion during the tour. Amongst other reasons given are the much greater range of voltages in use in Europe, and the greater variety of types demanded. Manufacturers in the United States have concentrated on a small number of types. Standardization and increased demand have led to a marked diminution in the cost of lighting. It is stated that since 1914 there has been a general increase of 60 per cent, in the cost of living; yet the cost of light has decreased by 50 per cent.

The "booming" of street lighting in America was mainly due to the manufacturing firms and the supply undertakings, and the research laboratories were chiefly supported by the manufacturers—one notable exception being the Bureau of Standards. Very little progress was the result of effort by municipalities. Other features of interest in America were the pleasing nature of lighting installations in the parks and the development of rural highway lighting—the latter facilitated by overhead cables along highways. A characteristic trait of the American is his pride in his city and his readiness to spend money to make it more admired.

#### THE INTERNATIONAL ILLUMINATION CONGRESS OF 1931.

In conclusion the authors referred to the forthcoming meeting of the I.C.I. in Great Britain in 1931. Many European and American lighting experts may be expected, and preparations cannot be made too soon. It will require a great effort to approach the generous hospitality, the organization, and the wealth and novelty of all forms of lighting shown to visitors in the United States. We must be prepared to face criticism of our ideas on public lighting. We may be unable to compete in the superlighting of prominent thoroughfares, but it is possible to show (1) first-class gas lighting, (2) better lighting in side streets, and (3) cities and towns plainly and inexpensively lighted, but evenly and with better visibility, for the same expenditure than in some leading American cities.

## Private Lighting as an Aid to Public Lighting

By J. S. DOW

"**P**UBLIC Lighting" is no longer regarded as comprising only the lighting of streets. Public lighting engineers are now called upon to study the use of light for the control of traffic, and in the years to come other duties may be added. The public lighting engineer of the future should therefore be an illuminating engineer, with a specialized knowledge of certain applications of light, but taking within his province every form of lighting that contributes to render a city visible at night.

#### INHERENT DIFFICULTIES OF STREET LIGHTING.

In street lighting, as at present practised, there are certain inherent difficulties. Lighting experts are aware that it is almost impossible to provide adequate lighting with posts at intervals of 100 feet or more. Reasonably even illumination between the lamps cannot be furnished without the danger of glare from light rays coming at angles slightly below the horizontal.

But the conditions are abnormal in other respects. The eye, exposed to the surrounding gloom of soot-darkened and feebly illuminated surfaces of neighbouring buildings, is in a state of dark-adaptation. Its sensitiveness to the isolated bright specks of light seen against this sombre background is enormously increased and its powers of perception are at a minimum. Glare is largely a matter of excessive contrast. Early workers laid down the rule that the contrast between the brightest and least bright objects within the field of vision should not exceed 100 : 1—a condition that can be readily complied with in the case of interior lighting, but is almost always violated in street lighting.

Moreover, in any moderately well-lighted interior objects are seen in their entirety because they are illuminated by diffused light coming from many different directions. But in a street this condition is not realized. Light is furnished only by individual lamps at long intervals. Frequently only the outlines of things are seen, sometimes as an object which is somewhat lighter than its background, but quite as frequently "in silhouette," i.e., a black outline seen against a splash of light on the wet or shiny roadway.

Apart from the technical difficulties of street lighting, referred to above, there is not the same direct appeal to self-interest as when one approaches the manager of a large shop or factory. Nevertheless, much might be

done by steady educational effort to raise the status of public lighting and to create a civic pride in the lighting of a city to which local authorities would quickly respond.

#### RURAL HIGHWAYS.

An appeal to business instinct has, however, been successfully made in cases of "parade lighting" in this country. In the United States the plan of obtaining contributions to public lighting from merchants located in important streets has been more extensively employed. Such methods might be more widely adopted in this country, though in planning such installations the needs of the public, as well as those of local merchants, should be considered. In the case of rural highways there is perhaps a special opportunity for private aid, e.g., from the motorists, for whose benefit arterial routes are constructed, or from the Ministry of Transport, on the ground that the lighting of routes for long-distance traffic should be a national responsibility.

Whatever be the form of control exercised over the lighting of arterial roads in the future, one would like to see the lighting schemed out on an ordered plan. In this mechanical age it is perhaps futile to lament that our main roads are becoming increasingly like railways; but more might be done to ensure that luminous traffic signals achieve their object without being too unsightly, and to induce some restraint in the lighting-up of petrol stations, wayside garages, advertisement placards, etc.

#### PRIVATE LIGHTING AS A SUPPLEMENT TO STREET LIGHTING.

Whatever be the future of private display lighting on rural roadways it has already become an important element in the illumination of cities. Much of the exterior lighting adopted by stores, restaurants or places of entertainment in their own interests forms a useful aid to public lighting. "Concealed" show-window lighting, for example, helps to enliven a street, and relieves the excessive contrast between public lamps and dark surroundings. The diffused light is just what is needed to soften shadows.

Equally interesting from the public lighting engineer's standpoint is floodlighting. Many of the light-surfaced buildings being put up in London offer excellent opportunities for such treatment, but the grime-encrusted exteriors of buildings in some industrial cities present difficulties, and the future development of floodlighting seems to be linked up with smoke abatement. A third source of supplementary street lighting from illuminated signs may also be of value, provided flashing signs of undue brilliancy are discouraged.

It is difficult to set a limit to the future possibilities of these various modes of lighting. One can conceive in the future streets lined by luminous light-surfaced buildings where the intrusion of lamp posts would seem an absurdity. If the idea of incorporating lighting elements in the frontages of buildings thus became general a natural step would be for the authorities to require provision to be made for the inclusion of public lighting apparatus when the plans are passed. Streets would then be lighted from units mounted at frequent intervals on the frontages of buildings, and falling naturally into place in the design; the actual street area would be freed from the obstruction of lamp posts and from the unsightly appearance of cables spanning the roadway.

This conception may seem visionary. Meantime owners of buildings could help towards the solution of the lighting problem by keeping the surfaces of buildings moderately clean, so that they serve as diffusers of light, and by consenting to the attachment of brackets to frontages of buildings. This practice, which would often render lamp posts unnecessary in narrow streets, is usually difficult to carry out in this country, unless (as in the City of London) special powers have been obtained. But in Cologne, where the street lighting has recently been remodelled, the centrally suspended lamps are supported throughout from brackets attached to the buildings, and with a spacing ratio of only *three to one*.

#### REGULATION OF PRIVATE LIGHTING.

Attention has frequently been called to the extraordinary variations in existing rules and regulations governing exterior lighting. In various cities permission has been sought from quite different authorities. Each has its own code of rules. In some cases these rules are concerned mainly with details of construction and have not been revised for many years. It is singular that they seem to be rarely framed to give guidance on the point of greatest interest from the standpoint of the illuminating engineer—the degree of brilliancy or the light. Floodlighting installations are likewise subject to varying restrictions. In some Continental cities the arrangements seem more flexible. For example, it is not unusual to find a number of floodlight projectors mounted on tramway poles for the purpose of floodlighting neighbouring buildings. In this country one of the first difficulties, and often a serious one, is to find a suitable site for the floodlighting projector.

If it were possible for local authorities throughout the country to be brought into agreement upon broad general principles in regard to exterior lighting (flood-lighting, luminous signs, shop façades, etc.), and if such problems could be invariably referred to the same official (eventually, perhaps, the public lighting engineer) for decision, this would help greatly towards the extension of such supplementary lighting.

#### THE LIGHTING OF HOUSE NAMES AND NUMBERS.

In the next section of his paper the author referred to the proposal that the numbers of houses should be illuminated, and that this practice should be enforced by local authorities, as is already the practice in some Continental cities. It was also suggested that names of streets in leading cities are often poorly revealed and that, in main thoroughfares at least, luminous-letter signs might be adopted. In this connection Mr. Dow asked why it was that only shops, theatres and restaurants advertised their existence by the use of light. Would it not be an advantage if post offices, police stations, libraries and public buildings of all kinds could embody luminous descriptive signs over the doorway for the benefit of the stranger?

#### CIVIC LIGHTING.

In conclusion, the author emphasized the value of light as an element in civic display. Just as enterprising local authorities plant trees and lay out parks and gardens to improve the appearance of a town by day, they will come, more and more, to make use of artificial light to reveal their towns or cities by night.

In Germany local authorities and lighting interests have recently combined in organizing "festivals of light," during which the cities were brilliantly illuminated. Floodlighting formed a leading feature of these displays. During the progress of the fête in Berlin as much as 20,000 kw. was thus expended.

The results of such displays have apparently more than fulfilled expectations. From the civic standpoint they helped to advertise the cities illuminated, bringing many visitors and increasing the volume of trade during the festival period. From the standpoint of the lighting interests the results were equally satisfactory. To many people the displays were a revelation, and the general expenditure on lighting in these cities has been raised to a permanent higher level.

#### CONCLUSION.

In conclusion, the author suggested that the application of artificial light in a city is a problem that should be considered as a whole. The use of this light for the benefit of citizens generally and in the interests of trade should not be entirely dissociated. Local authorities, merchants and entertainers and undertakings supplying gas and electricity should get together and make plans for the use of artificial light for their common benefit.

When illumination is so regarded there is really scarcely any form of exterior lighting which is not in some degree of interest to local authorities and to the public lighting engineer, whose work in the future may be of much more varied and comprehensive character than it usually is to-day.

### Discussion

Most of the papers summarized on previous pages led to comments. As the same topics were not infrequently raised more than once, it is convenient to deal with the discussion as a whole.

One point that was raised by several speakers, notably Councillor Thraves, Dr. Clark (Aberdeen), and others, was the treatment of various classes of streets. There was a general feeling that the less important thoroughfares in the poorer districts ought not to be neglected, and that it was better to aim at moderately good lighting of the city as a whole rather than to concentrate on very brilliant lighting in a few main thoroughfares. The lighting of rural highways proved to be another controversial topic. Mr. Lennox (Newcastle-upon-Tyne) pointed out the great difficulties of Rural Councils in connection with sections of arterial roads in their area. Some modification in the method of rating for public lighting in such districts was necessary, and the Ministry of Transport might assist the lighting of arterial roads out of revenue received from motor taxation. Mr. Colquhoun suggested that lighting of this kind might well come under the survey of the County Surveyor, though Mr. Langlands thought that Parish Councils might not respond to suggestions from outside. Attention was drawn to the practice in America, where the state is not infrequently responsible for all the lighting of rural thoroughfares within its boundaries. Mr. Lennox also emphasized the value of periodical demonstrations of the latest methods of street lighting in arousing local interest in the subject.

The paper by Messrs. Colquhoun and Stewart naturally led to discussion on differences between British and American practice. One point—the American tendency to concentrate on the lighting of important thoroughfares—has already been mentioned. It was evident, however, that several speakers were interested in the idea of inducing local merchants to pay for special lighting in business thoroughfares, though there was a general feeling that in any case the control of all public lighting should rest with the local authority. Mr.

Cramb and other speakers spoke with approval of the decorative pillars, terminating in diffusing glassware, in evidence in American cities, and suggested that there were special opportunities for such methods in such cities as Bournemouth.

The comments in several of the papers on the differences in the price of gas and electricity, and of electric lamps, in this country and America, aroused interest. A feeling was expressed that a standard rate for gas or electricity used for public lighting should be aimed at, and that a reduction in the price of lamps would be welcome. In connection with this last point it was nevertheless pointed out that conditions are very different in the United States, where, owing to the standardization of voltage, manufacturers are able to concentrate on a much smaller range of lamps, and where the outputs of lamps of a given type are so much greater.

Systems of traffic control by means of luminous signals also attracted attention, and the possibilities of such systems in this country were discussed. Mr. Colquhoun emphasized the important bearing of the standard lay-out of American cities, with straight streets intersecting at right angles, and remarked that in New York there were probably more traffic control signals in use than in all the rest of the world.

Mr. W. J. Jones emphasized the fundamental importance of closer spacing in order to provide effective street lighting, and agreed that the lighting-up of house numbers might well be an adjunct to public lighting. Architects should be taken into consultation in regard to the public lighting of important thoroughfares. Commander Haydn T. Harrison suggested that towns and villages should erect illuminated placards announcing their names to approaching motorists. He also commented on the inconvenient effect of tarred surfaces for roads, which rapidly became shiny.

In the course of the discussion it was suggested that in future the Association should prepare an annual report surveying progress in street lighting in the chief British cities. The President welcomed this suggestion, and expressed the hope that a report of this nature would be a feature of future gatherings.

## Illuminating Engineering Society (U.S.A.)

### Twenty-third Annual Convention

**I**N our last issue we referred to the above Convention, which was held in Philadelphia during September 24th to 27th. As usual, the papers cover a wide field. In what follows we summarize the programme, and we hope in coming issues to be able to refer to some of the papers more fully.

TUESDAY, SEPTEMBER 24TH.

#### 10-30 A.M.—*Opening Session.*

Address of Welcome—Hon. Harry A. Mackey, Mayor of Philadelphia.  
Response to Address of Welcome.  
President's Address—Merritt C. Huse.  
General Secretary's Report—A. B. Oday.  
Report of the Committee on Progress—J. W. Barker.  
The Art of Committee Work—Preston S. Millar.

#### 2 P.M.—*Light's Golden Jubilee Session.*

Opening Remarks by Merritt C. Huse, President, including demonstration of lighting in 1879 and 1929.  
Life of Thomas A. Edison—E. J. Cattell.  
Talking Motion Pictures.  
Pioneer Days in the Lighting Art—Elmer A. Sperry.  
Festive Lighting for Light's Golden Jubilee—A. L. Powell.  
Address by Hon. Charles A. Eaton.

WEDNESDAY, SEPTEMBER 25TH.

#### 9 A.M.—*Lighting Service Session.*

Ratio of Light to Power—Twenty Industrial Plants, Detroit, Michigan—H. E. Cook and T. G. Ward.  
Lighting Service Aid to the Architect—Leroy E. Kern.  
Influence of Wiring on Lighting Practice—E. A. Brand.  
Co-operative Promotion of Electrical Advertising—C. R. Tracy.  
Promotion of Street and Highway Lighting by Central Stations—W. T. Blackwell.

THURSDAY, SEPTEMBER 26TH.

#### 9-30 A.M.—*Lighting Practice Session.*

Theatre Lighting, Its Tragedies, Its Virtues—Frank Cambria and Francis M. Falge.  
Lighting Conditions and Problems in South Africa—H. A. Tinson.  
The Coloured Floodlighting of the International Exposition at Barcelona, Spain—Charles J. Stahl.  
Suggestions on the Design and Installation of Lighting Demonstrations—D. W. Atwater.  
Lighting of Outdoor Stages at Canadian National Exhibition—F. C. Mayberry and George G. Cousins.

#### 2 P.M.—*Natural Lighting Session.*

Calculation of Daylighting and Indirect Artificial Lighting by Protractor Method—H. H. Higbie and W. Turner-Szymanowski.  
Predetermination of Daylighting by the Fenestra Method—W. C. Randall and A. J. Martin.  
The Colour of Daylight—A. H. Taylor.  
Gasfilled Lamps as Photometric Standards—Ray P. Teele.

#### 2 P.M.—*Parallel General Session.*

Lighting à la Mode—J. L. Stair.  
Reflecting Properties of Flowers and Coloured Foliage—Samuel G. Hibben.  
The New Science of Seeing—M. Luckiesh and F. K. Moss.  
Progress Report—Sub-Committee on Testing Specifications—Walter Sturrock.

FRIDAY, SEPTEMBER 27TH.

#### 9-30 A.M.—*Symposium on Ultra-Violet Radiation.*

Measurement of Ultra-Violet Radiation in Natural Light—L. R. Koller.  
Hygienic Effects of Ultra-Violet Radiation in Daylight—H. P. Gage.  
Recent Developments of Window Materials and Fabrics for Transmitting Ultra-Violet Radiation—W. W. Coblenz.  
Sunlight—Natural and Synthetic—C. E. Greider and A. C. Downs.

## The Measurement and Recording of Rapid Variations in Light

A contribution by Mr. W. E. Meserve, Instructor at Cornell University, to the *Transactions* of the Illuminating Engineering Society (U.S.A.) describes a new apparatus for recording rapid fluctuations in the intensity of light. The author made use of the Burt photo-electric cell, which is of the sodium-vacuum type, but is made by a special process. The photo-electric current is amplified by means of a multi-stage vacuum-tube amplifier. With a suitable potential in series with the cell the current obtained is directly proportional to the illumination which the cell receives. The amplified current is conveyed to a Bedell-Reich oscilloscope. In the original paper the author illustrates the possibilities of the apparatus by numerous records showing the cyclical variation in light from incandescent lamps run on low-frequency circuits. It is suggested that the apparatus may have other applications, e.g., for astronomical work, for recording the density of smoke passing up factory chimneys, and for checking the quality of weave in the textile industry.

## The Illuminating Value of Electric Signs

In one of the papers read at the recent Conference of the Association of Public Lighting Engineers reference was made to the considerable degree of supplementary illumination received from illuminated signs, which in some great cities much exceeds that derived from the public lamps. We notice in *The Electrical World* a reference to an amusing illustration of this, furnished by the far-famed Commissioner Whalen, of the New York City Police Department. The incident arose out of a controversy between the Fifth Avenue Association and the electric sign manufacturers. Fifth Avenue, by prohibiting electric signs, feels that it has established an exclusive atmosphere. This atmosphere the Association desired to extend. It accordingly proposed that signs should be banned from the cross-streets within a certain zone on either side of the Avenue. The sign manufacturers were up in arms at this proposal, and in order to demonstrate the value of the electric sign they arranged to have 97 per cent. of the great displays on Broadway darkened on a certain evening for three minutes during theatre time. The demonstration was to have been widely advertised, and thousands of people were expected to congregate in order to judge how dark the streets would be without the signs. Commissioner Whalen feared that the resultant darkening would throw the traffic into confusion. The police stepped in and the demonstration was called off. The incident is interesting in showing that illuminated signs may serve a useful purpose in furnishing street illumination, besides their advertising value. It has been stated that on one occasion the public lamps in Brooklyn were inadvertently left unlighted without the public even becoming aware of the fact! Evidently the converse process—the extinction of the signs, leaving the streets illuminated solely by the public lamps—would not escape notice.

## Testing Sapphires by the Cathode Ray

It is stated in the *N.E.L.A. Bulletin* that a new application for the cathode tube has been found. Exposure to this apparatus enables genuine precious stones to be distinguished from spurious ones. Imitation sapphires, for instance, can readily be distinguished from the genuine variety. All but one kind of the genuine stone, and all imitations, glow brightly when exposed to the rays. But as soon as the rays are shut off the real sapphires lose their "glow," whilst that of the imitation stones persists for some time afterwards. Sapphires from different localities can also be distinguished by the nature of the glow. Thus stones from Montana can be easily separated from those derived from Australian sources.

## The Industrial Health Research Board

This useful body, for which Mr. D. R. Wilson, C.B.E., M.A., acts as secretary, has recently submitted to a change of name. It was formerly known as the Industrial Fatigue Research Board, a title which was bestowed during the war, when much of the work of the Board was concerned with conditions of work in munitions factories. The substitution of "Health" for "Fatigue" is felt to be a judicious step. Not only does it more truly describe the work of the Board, which now covers many questions besides fatigue, but it has also the merit of giving a positive impression rather than a negative one, i.e., that the work aims at enhancing health rather than merely eliminating prejudicial factors.

Another change that may be noted is the retirement of Viscount D'Abernon, who has served as chairman since February, 1927. On the invitation of the Medical Research Council, Lieut.-Col. Sir Arnold Wilson, K.C.I.E., C.S.I., C.M.G., D.S.O., has consented to accept the chairmanship as from June, 1929.

The ninth annual report of the Board, now before us,\* serves to show the wide scope of its activities. Three main forms of investigations are conducted: (a) Particular problems of wide industrial importance, (b) specific problems submitted by Government departments, and (c) laboratory researches. Amongst the former may be mentioned such matters as hours of work, ventilation, vision and lighting, accident causation, and noise and vibration. Under (b) are mentioned the study of sickness in various industries, absenteeism amongst miners, and vocational selection for Government departments. Under (c) we find records of researches into principles governing muscular activity, the transfer of acquired skill, and the relation of age to the acquirement of dexterity.

All these are problems of obvious importance in relation to industrial efficiency. Of special interest to our readers is the series of researches on vision and lighting. We recently referred to some further investigations by Mr. H. C. Weston and Mr. S. Adams, whose work on such processes as the mounting of filaments and drawing-in weaving has confirmed the conclusions drawn in regard to the importance of specially constructed spectacles for linking in hosiery.

We attach special importance to this inquiry because of its evident bearing on the determination of conditions of illumination requisite for various processes.

There are numerous scientific and special committees related to the Board, and it should be unnecessary to recall to readers the very valuable work that it has done in association with the Illumination Research Committee—the success of which is likewise due in a large measure to the efforts of Mr. D. R. Wilson.

## Department of Scientific and Industrial Research

Under the Order in Council dated 6th February, 1928, the Lord President of the Council has appointed the Rt. Hon. Lord Rayleigh, Sc.D., F.R.S., Sir Arthur Balfour, K.B.E., Sir William H. Bragg, K.B.E., D.Sc., F.R.S., and Sir James Walker, D.Sc., Ph.D., LL.D., F.R.S., to be members of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research.

The following members of the Advisory Council have retired on completion of their terms of office: Sir H. C. Harold Carpenter, F.R.S., Dr. G. C. Clayton, C.B.E., Sir Richard T. Glazebrook, K.C.B., F.R.S., and Sir James H. Jeans, D.Sc., LL.D., Sec.R.S.

\* Ninth Annual Report of the Industrial Health Research Board to December 31st, 1928 (H.M. Stationery Office, gd. net).



## Some Striking Examples of Floodlighting

In order to illustrate the possibilities of floodlighting in adding to the attractions of cities and seaside towns by night, we give in Figs. 1 to 4 a few striking examples, all of which were included in the

shows the floodlighting of the Bathing Pool at Brighton by means of miniature standards round the parapets. We are indebted to the General Electric Co. Ltd. for all these three illustrations.

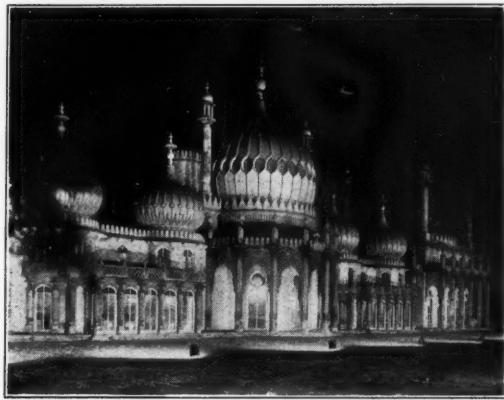


FIG. 1.—Floodlighting of the Royal Pavilion, Brighton.

series of lantern slides shown by Mr. J. S. Dow in his paper at the Conference of the Association of Public Lighting Engineers, held in Bournemouth last month.

The first of these shows the floodlighting of the Royal Brighton Pavilion by means of a battery of G.E.C. reflectors installed on the lawns in front of the pavilion.

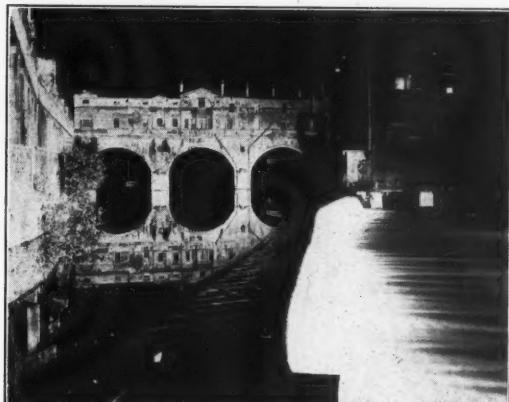


FIG. 2.—A Night View of the Old Roman Pulteney Bridge, Bath—a charming floodlighting effect.

The final illustration, Fig. 4, which shows the appearance of the Grand Hotel, Torquay, was furnished by the British Thomson-Houston Co. Ltd. The floodlighting of hotels along the front of seaside places is a matter which may be commended to the attention of proprietors. Such floodlighting would doubtless serve



FIG. 3.—Floodlighting of the Bathing Pool at Brighton.

In Fig. 2 we have a charming view showing the old Roman Pulteney Bridge at Bath, and the Weir. Fig. 3



FIG. 4.—Showing the Floodlighting of the Grand Hotel, Torquay.

to render the appearance of a sea front more interesting by night, as well as helping to attract custom.

## Association of Public Lighting Engineers Exhibition of Lamps and Lighting Appliances at Bournemouth

**I**N our last issue (pp. 226-228) we gave a brief forecast of the exhibits in prospect at the Exhibition of Public Lamps and Lighting Appliances, arranged by the Association of Public Lighting Engineers at Bournemouth during September 9th-12th. The exhibit was, as usual, a comprehensive one, which attracted a full measure of attention from members attending the Conference, though, as often happens, the attendance tended to fall off towards the end of the Conference, when most of the visitors had already had opportunities of seeing everything. One is inclined to suggest that on another occasion it might be an advantage, from the exhibitors' standpoint, if the period of the exhibition were somewhat shortened, and if the official period of inspection were fixed earlier—possibly on the afternoon of the opening day.

Gas and electric lighting were both represented, and a feature on this occasion was the variety of accessory apparatus, such as wiring accessories, time switches, and—a new development in street lighting—demonstra-

Supplies Ltd., W. Sugg & Co. Ltd., Venner Time Switches Ltd., Wardle Engineering Co. Ltd.

### *The G.E.C. Exhibit.*

A leading feature of the display of the General Electric Co. Ltd. was the series of Wembley lanterns, of the type recently adopted for the lighting of the Thames Embankment, photographs of which were mounted on the background of their stall (see Fig. 1). We give in Fig. 2 a typical view of the Wembley lantern, and in Fig. 3 is one of the asymmetric refractors recently introduced by this firm. A new small asymmetric refractor designed for use with 60, 100 and 150-watt lamps has recently been introduced. A novelty is the non-ventilated Wembley lantern, which presents advantages from the standpoint of avoidance of dust deposits, and has made possible a material gain in efficiency. The Wembley lantern, as here illustrated, is designed primarily with a view to efficient distribution of light, but we were struck by an adjacent lantern with a white glass upper portion and a



FIG. 1.—Showing the new lighting of the Thames Embankment by G.E.C. Wembley Lanterns and Osram Lamps.

tions of the uses of selenium cells for the control of public lamps.

The list of firms exhibiting was as follows:—

The British Thomson - Houston Co. Ltd., The Bromford Tube Co., The Electric Street-Lighting Apparatus Co. Ltd., Edgar & Co., Engineering & Lighting Equipment Co. Ltd., Foster & Pullen Ltd., Gas Meter Co. Ltd., General Electric Co. Ltd., W. R. Gunning & Co., Horstmann Gear Co., Korting & Mathiesen Electrical Ltd., Holophane Ltd., Lighting Trades Ltd., Metro-Vick Supplies Ltd., Municipal Supplies Ltd., W. Parkinson & Co., Radiovoser Parent Ltd., Revo Electric Ltd., Siemens Electric Lamps &

rippled glass globe below, in which the standard refractor can be accommodated. One would imagine that this would give a more pleasing effect than the clear glass globe; the directive effect is presumably not greatly affected, so that this should prove a popular form. Amongst other novelties at this stand we noticed a new metal reflector of the asymmetric type, which should be useful in secondary streets. This was shown operated by a photo-electric cell and relay—a new form of control which the General Electric Co. Ltd. is developing.

One also noticed some ingenious models and diagrams devised to illustrate the distribution of light from asymmetric units—always a somewhat difficult device to explain to non-technical people.

Perhaps the most interesting object at this stall was an ingeniously equipped box devised to illustrate the effect of different methods of street lighting. Looking through an eyepiece the observer had a view of a model street, equipped with miniature lamps. The model enables nine different systems of lighting in six different types of streets to be shown. The effect of the photographs of typical series of buildings which form the sides of the "streets" is quite life-like. By turning a knob

the action of the rippled-glass outer globe. The familiar bowl reflectors are now available in six types, symmetrical, asymmetrical, 2-way non-axial, 2-way



FIG. 2.—A view of the Wembley Lantern.

these photographs may be varied, or a shiny and apparently wet road surface may be substituted for a dry one. Another mirror arrangement causes the extremity of the street to run either uphill or downhill. So far as possible the scale of the lamp candle-power is preserved, i.e., the illumination on the floor of the model approaches that met with in actual street-lighting installations. It is naturally impossible to imitate exactly the distribution of light; nevertheless a very fair general impression of an actual street at night is obtained.

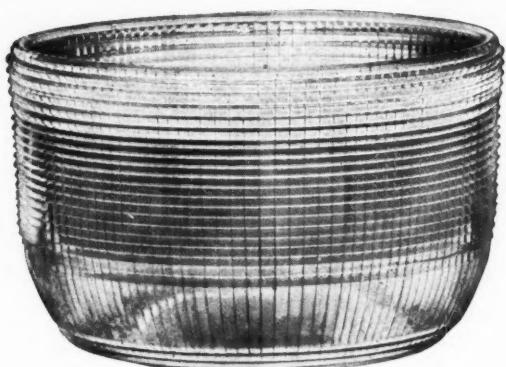


FIG. 3.—The G.E.C. Asymmetric Refractor.

#### Holophane Exhibits.

The Holophane exhibit was, as usual, a very representative one. In Figs. 4 to 6 we are illustrating a typical refractor lantern, a lantern with a rippled-glass enclosing globe, and a new ornamental refractor of the pedestal type. The latter is a pleasing unit. We notice another new fitting of this type, consisting of four separate prismatic members assembled together, showing an external smooth surface, which is a distinct achievement in prismatic-glass design. The unit illustrated in Fig. 5 strikes us as a particularly useful one; one gains the benefit of the directive device in light distribution, and at the same time secures moderate brilliancy owing to



FIG. 4.—Holophane Refractor Lantern.

axial, 3-way non-axial, and 4-way axial. Dome refractors have also been further developed, and 2-way asymmetrical types are now available, whilst band-type refractors are now made in the symmetrical and 2-way axial types. Perhaps one of the most distinctive features of Holophane street-lighting units is the development of these asymmetric, 2-way, 3-way and 4-way types. These enable almost any problem to be dealt with. Their properties are illustrated by polar curves in the latest catalogue, which appears with a full-size page and is an imposing production. However, the calculations involved in applying these units are somewhat complex, and this leads us to refer to an ingenious item, the Holophane Table of Street-lighting Calculations attached to the inside cover of the latest catalogue, and prominently featured at the Holophane stall. The compilation of these data must have involved a vast amount of work. Briefly the table is intended to assist public lighting engineers in complying with the requirements of the British Standard Specification for Street Lighting. It indicates (1) the candle-power



FIG. 5.—Holophane Rippled-Globe Lantern showing lantern partly removed and dome-type refractor inside.



FIG. 6.—Ornamental Holophane Refractor (Pedestal Type).

required from each unit, projected towards the test point; (2) the angle from the vertical at which the above candle-power is required; (3) the type of Holophane prismatic refractor most suitable; and (4) the candle-power and angle to provide the stated minimum intensity midway between posts. The table is prepared for all the eight classes of installations represented in the specification (A—H). Three diagrams illustrating the positions of test points and the lay-out of typical systems are utilized, and six main types of refractors, indicated in the table by distinguishing letters, are recommended.

Numerous other units were on view, amongst which the new "Spot-O-lite" unit applicable to such purposes as the illumination of public clocks or police officers on point duty may be mentioned. The application of prismatic plates and bands, both to lanterns of the square type and circular type for gas lighting, was also illustrated here and elsewhere at the exhibition. We shall return to this item presently.

#### *Siemens Electric Lamps and Supplies Ltd.*

At this stall a wide conception of public lighting was shown, many devices and units other than those



FIG. 7.—The "Silvalux" Street-Lighting Unit.

intended specifically for street lighting being represented. A feature was the display of units, both for street lighting and for the illumination of public buildings, utilizing "Silvalux" opal gasfilled lamps. There can be no doubt of the advantages of such lamps in diminishing glare and giving softness of effect. In Fig. 7 we illustrate the "Silvalux" street-lighting unit, which makes use of a vitreous-enamelled reflector of special curvature to assist the distribution of light at

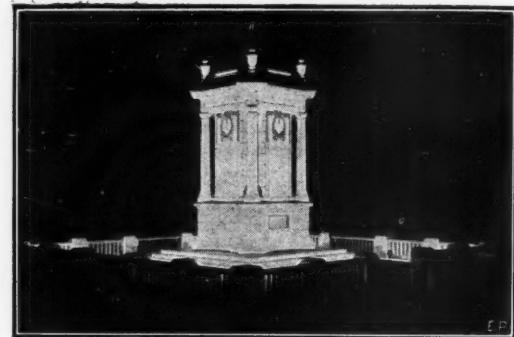


FIG. 8.—Showing the Floodlighting of the War Memorial, situated outside the Town Hall.

about 15° below the horizontal. Amongst street-lighting designs we may also mention the Sheffield unit, which is of the exposed form rather popular for street lighting in less important streets, but manifestly improved in effect by the use of a lamp with an opal bulb. At this stall Holophane refractor units and the familiar Benjamin "Biflector" and "Rodalux" designs were on view. Mention may also be made of the new "Ultralite" enclosed unit, with a glass canopy in place of a metal one, and the "Helilux" moulded-glass decorative units. A new fitting, the "Eralite," is designed to give illumination resembling natural diffused daylight, and should be in demand for the lighting of imposing rooms in public buildings. There were also various types of traffic signs, such as the pedestal unit with ruby globe at top, the triangular caution sign for use at crossings and a simple form of direction sign. Other more decorative forms of letter-signs were also shown.

In Fig. 8 we have another Siemens exhibit at Bournemouth, the floodlighted war memorial, which is situated in the gardens in the immediate vicinity of the Town Hall, where the Conference was held. This inevitably attracted the attention of delegates. The installation was carried out by the Corporation Lighting Department, with the assistance of the staff of Messrs. Siemens Electric Lamps and Supplies Ltd., and utilizes Siemens lamps and Siemens-Holophane floodlight projectors. It comprises four 500-watt units placed inconspicuously in the corners of the surround. The effect may be judged from the illustration and afforded a useful object lesson of the possibilities of floodlighting for memorials, etc.



FIG. 9.—The "Falkland" Lantern, shown at the Ediswan Stall.

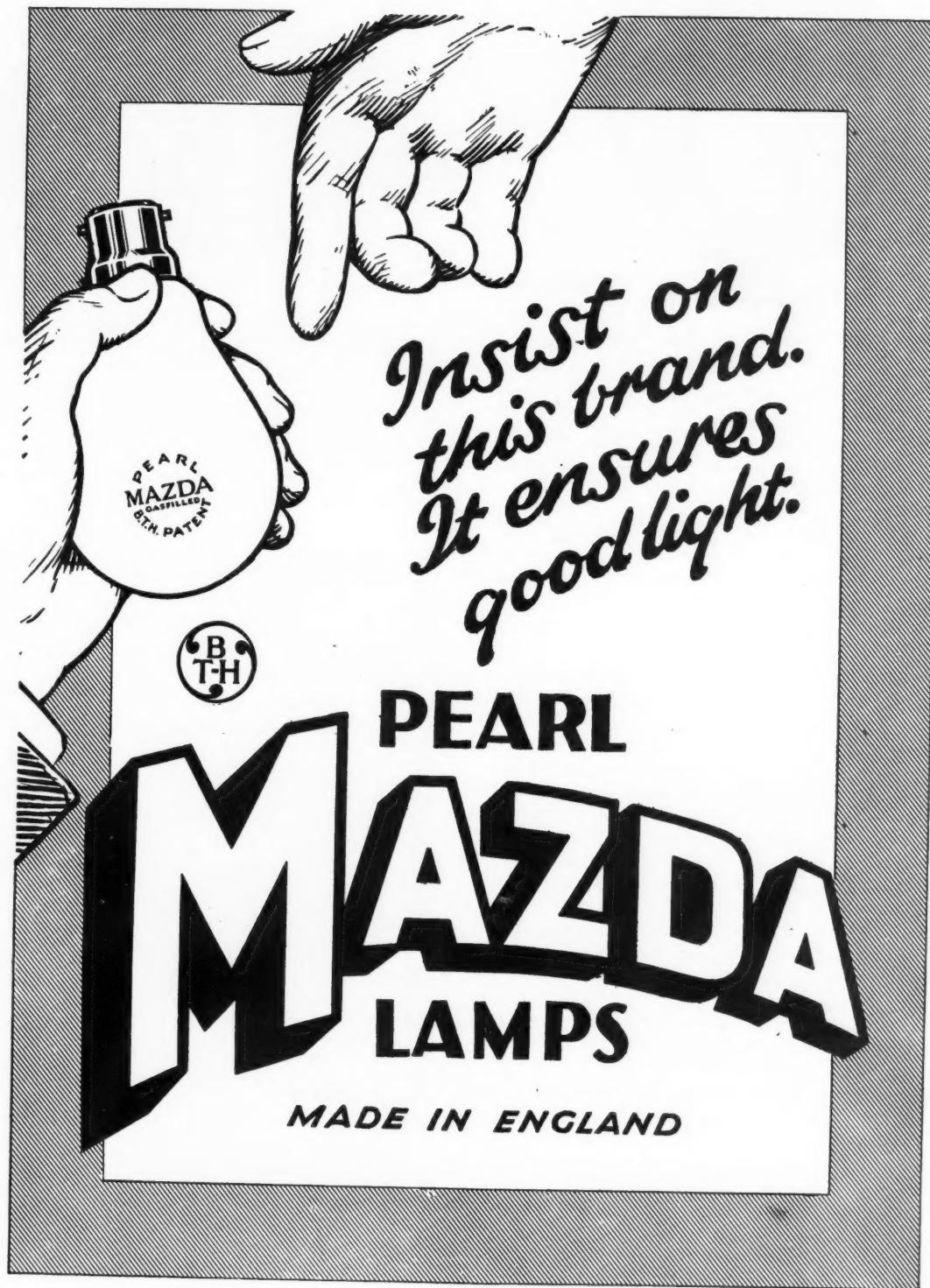




FIG. 10.—Spherical Projector Lantern.



FIG. 11.—A new Gas and Water-tight Lantern.

*The Ediswan Stall.*

At the Ediswan stall there was a representative range of lamps (both Mazda and Ediswan), and electrical accessories, such as holders, fuse boxes, time switches, etc. Our attention was drawn to several neat and ingenious mechanical devices in the assembly of fittings, designed to enable a reflector to be easily detached for cleaning purposes, or an outer globe to be swung aside so as to give access to the lamp inside. The stall was mainly devoted to an assembly of typical street-lighting units manufactured by the British Thomson-Houston Co. Ltd. We were specially struck by the pictorial display with a "Rugby" lantern mounted on a pillar in the foreground. This form of rippled glass gives a soft and pleasing effect, reminiscent of sunlight breaking through a light cloud. Amongst other well-known lanterns exhibited were those of the "Falkland," "London," "Leeds," "Swansea" and "Kent" types. The "Falkland" lantern here illustrated (see Fig. 9) is of the general type, and utilizes a vitreous enamelled reflector above a diffusing globe. This fitting is made in one size, suitable for a 100 or 200 watt gasfilled lamp, and can be furnished with either a clear or opalescent globe. A feature is the special attachment (for which a patent is pending) which, while giving easy access for removal of the globe for lamp renewal and cleaning, is completely positive in action when the globe is in position, and, furthermore, overcomes the difficulty of the old type gallery screw in that the pressure cannot be exerted on the glass. Easy access is again a feature of the "London" lantern, which has been developed for general street lighting. The "Kent" design, like the "Rugby," is of the diffusing type, and struck us as a graceful design.

Numerous other special fittings were shown. We may mention the projector lantern (Fig. 9), which is a combination of a street-lighting lantern and a floodlight projector, and is designed for the purpose of floodlighting the faces of buildings, monuments, etc. Most of the glass panels in this composite lantern are opalescent and illuminated by a special diffusing arrangement, but clear panels are furnished to enable the floodlight beam to be trained on any object. It will thus be seen that the floodlighting mechanism is itself concealed from view. The lantern has a decorative appearance, and is specially effective when mounted centrally on a pillar, with diffusing globes on either side to furnish general lighting. In Fig. 11 we have a newly introduced type of gas and water-tight well-glass fitting, which is furnished with an efficient reflector of vitreous-enamelled steel. A wireguard is provided, and the lampholder is of the usual B.T.H. all-porcelain type.

*Engineering & Lighting Equipment Ltd.*

The contents of this stall will be understood from the accompanying illustration (Fig. 12). A feature is the display of the new "White-way" fittings of the "Greenock" type, which were shown for the first time. This type of fitting has proved very popular in South Africa, where they are in use in a number of the chief cities. They represent a form of street lighting which, in our opinion, is likely to become more usual in this



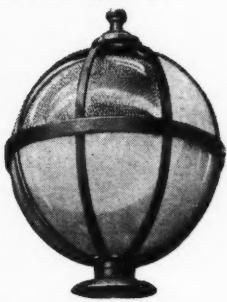
FIG. 12.—A view of the Stall of Engineering &amp; Lighting Equipment Ltd.

country in the future, owing to the graceful appearance of the lantern and the diminution of glare associated with the use of diffusing glass. As will be gathered from the illustration, however, numerous other forms of street-lighting fittings, some of the directive type, were included in this exhibit. Amongst these may be mentioned the "Glasgow" fitting, with a two-way band type refractor, which is suitable for lamps up to 1,500-watt capacity, and the "Trent" unit, which is similar in design, but intended for lamps up to 500 watts. Another feature at this stall was the representative display of "Acme" time switches, etc., some of which may be noticed in the foreground.

# NEW Weatherproof Lighting Units-

**now—a range to suit  
any surroundings**

MANY new weatherproof units have been added to our already comprehensive range of lighting equipment. Whatever the style of architecture, whatever the environment or occasion, whatever the lighting requirements, we can supply a lantern, a standard and a lamp to satisfactorily meet the situation and our expert Lighting Engineers are ready to give you—without obligation—their advice on all kinds of outdoor lighting.



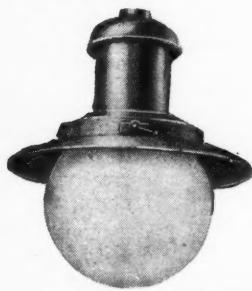
Spherical Projector Lantern

This unit is a combination of a street lighting lantern and a floodlight projector—designed to floodlight the faces of buildings while retaining the appearance of a diffusing globe. The majority of the glass panels are opalescent but in the direction through which the floodlight beam is to be trained, clear glass panels are provided. One lamp—a projector lamp—only is required.



The "DURHAM" LANTERN

A completely weatherproof unit of simple design consisting of a cast-iron canopy with vitreous enamelled reflector. A hinged cast-iron ring carries a pine-shaped clear or diffusing globe. An all-porcelain lamp-holder is included.



The "FALKLAND" LANTERN

The globe of this simple unit is carried by a special attachment (for which a patent is pending) so arranged that it is positively locked when in position. It overcomes the difficulty of the old type gallery screws in that pressure cannot be exerted on the glass. Finished in grey enamel outside and white inside, and provided with a detachable cast-iron cap.



UNIT TYPE 174 FORM A

A strongly constructed unit introduced for situations requiring a small gas and watertight well-glass fitting with an efficient reflector for the correct distribution of light. It is a further adaptation of the well-known Mazdalux Reflector.



L.A.9

## B.T.H. LIGHTING EQUIPMENT

THE EDISON SWAN ELECTRIC COMPANY, LIMITED

(INCORPORATING THE WIRING SUPPLIES, LIGHTING ENGINEERING, REFRIGERATION AND  
RADIO BUSINESS OF THE BRITISH THOMSON-HOUSTON CO., LTD.)

Commercial Lighting Dept., 1a, Newman Street, Oxford Street, London, W.1

Branches in all the Principal Towns.

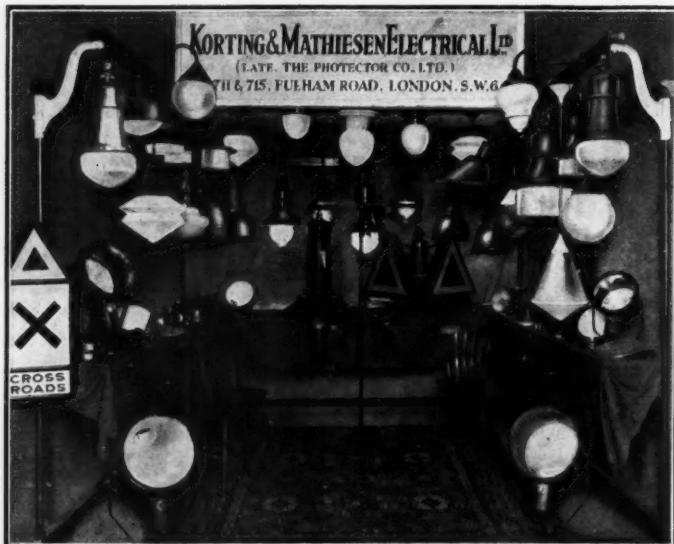


FIG. 13.—A general view of the Stand of Korting &amp; Mathiesen Electrical Ltd.

*Korting & Mathiesen Electrical Ltd.*

This stall was perhaps one of the most varied ones at the exhibition. A general view is shown in Fig. 13. The lighting units here illustrated include the now familiar "Mirrorlite" lantern, which utilizes a prismatic reflector within a metal covering, terminating in a diffusing ring of glass, the recently introduced "Glowband" lantern, the "hoarding reflector" (a unit with special contour developed for lighting hoardings and large vertical surfaces), and the new "Steelopalite" industrial lighting unit. The "Mirrorlite" lantern, which was on view at Sheffield last year, is now familiar to most of our readers, its leading feature being the combination of an extension distribution curve with protection against glare. The "Glowband" unit is still something of a novelty. The large pattern here shown is intended to take two lamps, either two 300-watt, two 500-watt, or two 750-watt—an arrangement which enables the street lighting to be diminished after a certain hour at night by extinguishing one of the lamps. Smaller units, available for lamps of 100 watts upwards, are also available. The relatively deep diffusing-glass cylinder used with this type of unit acts as an effective protection against glare, and we understand that such units are becoming increasingly popular on the Continent. The industrial reflector shown in Fig. 16 is also a novelty. It utilizes a vitreous-enamelled steel reflector with an opalescent satin-finished globe of special shape. This unit combines qualities not usually found in combination, e.g., whilst most of the light is reflected downwards the light is yet diffused by the opalescent globe; further, this globe is so shaped that an appreciable amount of light can escape outwards and upwards, with the result that one avoids the relatively dark effect in the upper parts of the room and the formation of a hard shadow line which is apt to arise when metal reflectors are used.

A glance at Fig. 13 reveals other distinctive units, such as the "Throlite" unit, equipped with illuminated triangular sign for street crossings, the "Dia" long-burning enclosed flame arc lamp (the only arc lamp shown at this exhibition), and numerous diffusing units suitable for the general lighting of municipal offices, etc.

*Met-Vick Supplies Ltd.*

The display at this stand includes examples of the "Nile," "Spherical" and "Brighton" units, together with Holophane street lanterns, and several works-lighting fittings of the focussing, angle and dispersion types suitable for factory and yard lighting. A selection of commercial-type "Silverstone" units was

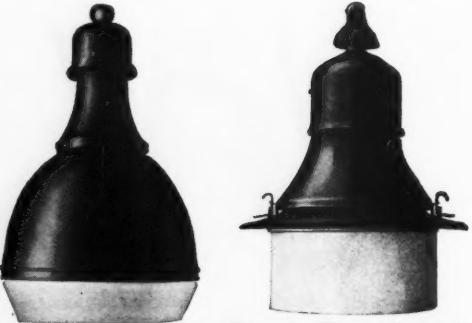


FIG. 14.—The "Mirrorlite" Street-lighting Unit. FIG. 15.—The "Glowband" Lantern, with diffusing protective band.

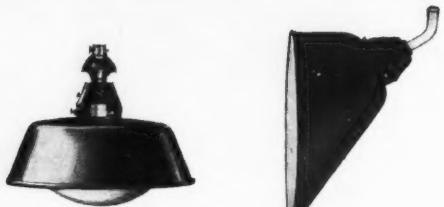


FIG. 16.—The new Kandem "Steelopalite" Industrial Lighting Unit.

FIG. 17.—The "Hoarding" Reflector.

on view, a feature being two types of fittings recently designed for hospital lighting. We understand that the Met-Vick "flooding" projectors included in the exhibit represent a distinct advance upon earlier models, and furnish ample and evenly diffused illumination conjointly with high efficiency and mechanical strength.

Other items included a display of "Bakelite" accessories and photographs of typical installations.

The most novel item in connection with street lighting was doubtless the new "Street-Ray" reflector, which is of simple but original design. This unit embodies an upper dome reflector of metal, which, unassisted, will give symmetrical light distribution. It is, however, supplemented by a metal flange of special contour which contributes an asymmetric effect, and it is expected that this simple unit may be of service in lighting many secondary streets where more elaborate and expensive fittings cannot be entertained.

*Revo Electric Ltd.*

At this stand there were some interesting exhibits, particularly three types of lanterns with refractor glasses. These included a large lantern, suitable for 1,000 and 500 watt lamps, which we are informed has been used with success in many of the large cities; it has a handsome appearance, being made both in polished copper or vitreous-enamelled sheet iron, and has the "Revo" adjustable lampholder, so that the filament may be correctly fixed. There are four sizes of this particular lantern, the smallest being suitable for 100 watts.

Amongst other fittings shown, we may mention the "City" fitting, which consists of a sheet-metal reflector with cast-iron canopy and porcelain lampholder. This fitting is made in various sizes from 60 to 500 watts.

One of the most effective lanterns exhibited was the "Peterborough," which was specially designed for the city of Peterborough. This lantern, fitted with diffusing glass and surmounted by a copper canopy, harmonizes well with its surroundings in this ancient city.

One item, which should be of interest to most borough engineers, was the traffic sign, consisting of a neat frame carrying three enamelled plates indicating both the name of the main street and the side streets. This should prove useful to a good many towns, as when it is clamped on the swan-neck of the bracket it gives an indication of locality not only to pedestrians but to passing motorists. The new "Preston" suspension gear, a convenient apparatus for centrally suspended lamps, was also exhibited.

*The Electric Street-Lighting Apparatus Co. Ltd.*

The "Croydon" and "Bi-Multi" fittings at this stand are familiar in principle, but several newly designed types were on view. Amongst these may be mentioned a new adjustable directional fitting for junctions and cross roads, a feature of which is that the reflectors can be separately adjusted to any desired angle; this fitting can be supplied with reflectors of either of the two main types mentioned above. A feature of these special reflectors is the highly directive effect obtained from the series of inclined mirrors (as seen in Fig. 19). But at Bournemouth a new type of reflector, utilizing the same mirror system but giving symmetrical distribution, was shown. This reflector is roughly conical in shape, and is intended for the lighting of extensive open spaces, where directional effect is not required. An effective demonstration of its possibilities was afforded by the high mast near the pier at Bournemouth, a view of which appears in Fig. 18. This high mast carried three 1,000-watt units of the symmetrical type. The area illuminated is very extensive, the main angle of dispersion of light from the reflectors being apparently in the neighbourhood of 140°. Other exhibits included simple conversion fittings, line fuses and connectors, ironclad switches and compact forms of time switches.

*The Wardle Engineering Co. Ltd.*

This stand included lanterns with both plain and directive glassware, brackets for pillar and pole mounting, water-tight boxes incorporating control gear of various types, open-type reflectors of the single and multiple lamp patterns; and also a selection of accessories for counter display. The well-known "Bruce" lantern, which attracted much attention at the British Industries Fair, was a prominent feature of the exhibit, and we noticed several Holophane lanterns. Another item of interest to public lighting engineers was the new prismatic directional bulkhead fitting, which should prove useful for the lighting of tunnels, subways, etc.

*Messrs. Wm. Sugg & Co. Ltd.*

Amongst gas-lighting exhibits one naturally turns to the exhibit of Messrs. Wm. Sugg & Co. This includes a full range of the firm's standard "Rochester," "Littleton," "Promenade," "Grosvenor," and other types of lamps, whilst the "Windsor" lamps included several equipped with the new Holophane directional refracting plates. Other items include lamps for garage lighting, back lamps for underground conveniences, and an assortment of conversion fittings for existing lamps, governors, controllers, etc.

The "Garage" rack lamp struck us as an ingenious and useful contrivance. There was also on view an industrial lighting unit, comprising a lower diffusing dish under a bowl-shaped metal reflector, which appeared to give a very powerful and well-diffused downward illumination. The "Reflex" danger sign, which was, we believe, first shown at Brighton in 1927, was again in evidence. We noticed on the walls some excellent night photographs of the installation carried out by the firm at the Brighton Greyhound Racing Track.

*Lighting Trades Ltd. and Welsbach Light Co. Ltd.—Joint Exhibit.*

An item at this stall which at once caught the eye of visitors was the central pyramid of "Welsbach" and "Ironclad" incandescent mantles, ranging in size from  $\frac{1}{2}$  in. to 9 ins. high and in candle-power from 5 to 7,500, and illustrating how completely these companies cater for the mantle requirements of the gas industry. We were particularly interested in the large soft mantles used for lighthouse work—a field in which incandescent oil lighting still finds opportunities of useful service. But perhaps the main feature of the exhibit was the demonstration it afforded of the lighting efficiency of "Renown" magnesium superheater burners, which are now being used in increasing quantities for public lighting work. It is no secret that Lighting Trades Ltd. have been making special efforts to bring their appliances to the knowledge of gas com-

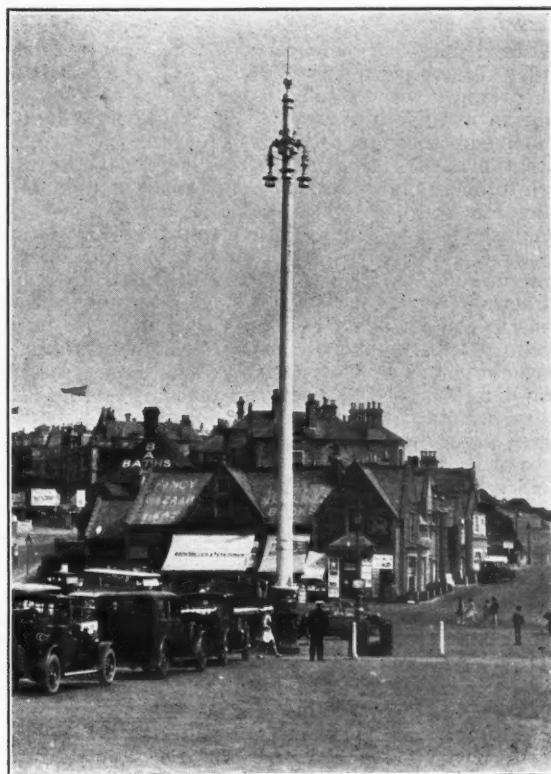


FIG. 18.—A view of the High Mast near the Pier at Bournemouth, bearing three 1,000-watt lamps in Concentrating E.S.L.A. Reflectors.

panies throughout the country, and have offered special facilities for its adoption. "Renown" burners are now being made for clusters of two to twelve mantles, either Bijou or No. 2 size, with the nozzles (which are detachable) arranged in various formations according to the size of the preheating chamber. It will be recalled that the advantage of the "Renown" superheater lies in the unique construction of the interior, which is designed to eliminate back-firing, even with greatly reduced pressure, and to ensure smooth and silent lighting and extinguishing. "Renown" burners were shown on a number of street lanterns fitted with automatic controllers regulated to demonstrate continuous lighting and extinguishing. In the course of our visit we had opportunities of judging how soft and silent the lighting and extinguishing of burners equipped with this device becomes. The design, which has been illustrated in previous issues of this journal, is a very simple one, but it is none the less effective. Apart from this, there is a material lengthening of the life of mantles, which are no longer caused to deteriorate owing to incinerated dust and dirt being drawn into the fabric.



FIG. 19.—The E.S.L.A. "Bi-Multi" Fitting.

*Messrs. Foster & Pullen Ltd.*

The display by this firm was a representative one, and included specimens of the "Avil" inverted and other lamps with which its name is associated. In Fig. 20 we give a view of the "Southport" lantern, which embodies an adjustable reflecting device, the invention of Mr. John Bond. This enables the direction sign to be strongly illuminated without the light available for ordinary purposes of illumination being diminished. The most interesting item in Messrs. Foster & Pullen's display, however, was the series of lanterns equipped with Holophane prismatic directional refracting plates—one of the most important contributions to equipment for public lighting with gas during recent years. This plate was shown in operation at Sheffield last year; but on this occasion new types were shown, a feature being a curved form which can be fitted into a standard lantern and applied to cluster burners. These prismatic plates are described in the exhibition issue of *The Lantern World*, a little magazine issued by Messrs. Foster & Pullen Ltd. With considerable enterprise a column was devoted to the Conference of the Association; other articles dealt with "The Lighting Load," "Shoddy Burners," etc.

*Messrs. W. Parkinson & Co.*

This exhibit included a comprehensive range of street lamps and public-lighting requisites. Amongst these may be mentioned the "Blackpool" pattern lamp, with burners arranged in tiers. This lamp is of the square type, but the patent burner is also supplied in circular lanterns and suspension and "U" fixing lamps. This arrangement of the burners results in a very important increased illuminating effect from any given number of mantles. Types of street lamps fitted with burners having mantles in alignment (not in clusters) were also on view. This arrangement obviates the loss caused by the mantles screening one another, and the maximum illumination is therefore directed along the street. A feature of the burners for street-lighting purposes was the metallized surfaces, by means of which the corrosion caused by the constant contact of the products of combustion may be avoided. The arrangement of the mantles in alignment is also carried out with conversion-type burners, and some of these can be readily adapted for midnight reduction.

*Luminous Traffic-Control Signals.*

It remains to draw attention to two of the most interesting features of the exhibition—the use of luminous signals for traffic control, and the automatic control of gas and electric lamps for public lighting.

Complete signal systems, based on the use of red, green and amber lenses, were shown by Met-Vick Supplies Ltd., the Wardle Engineering Co. Ltd., and Messrs. Siemens and General Electric Signals Co. Ltd. The latter exhibit was particularly complete and interesting. It is evident that these devices are going to be much more widely adopted in this country in the future, and it may be mentioned that a useful memorandum on their use has recently been issued by the Ministry of Transport.

*Automatic Control of Public Lamps.*

The familiar methods of automatic control of public lamps were well illustrated at the stalls of Messrs. Venner Time Switches Ltd., The Gas Meter Co. Ltd., and The Horstmann Gear Co. Ltd. Messrs. Venner Time Switches Ltd. exhibited a full range of time switches for street-lighting control, both of the hand and electrically controlled types, switches for individual posts, small groups and heavy-capacity switches for controlling large groups, etc. There were also numerous special models, such as those designed for the G.P.O. relays of varying capacity, a time switch for a synchronous motor, and a complete range of boxes for housing street-lighting switches of all kinds.

The Gas Meter Co. Ltd. showed samples of their well-known "London" automatic controller, and also a controller specially adapted for shop lighting. This can be arranged to light and extinguish burners six out of the seven days of the week. There was also shown a cluster-controller which, at lighting time, puts on a

complete cluster in a street lamp, but extinguishes one section at a predetermined time and the remainder at sunrise.

There were many callers at the stand of the Horstmann Gear Co. Ltd., where, as usual, clocks and control gear showing great ingenuity and most accurate workmanship were seen and admired. The range of operations that can thus be dealt with is really extraordinary. There can be little doubt, however, that the exhibit that attracted most curiosity was the Newbridge positive distance gas switch, which has only been introduced within the last few months. The operation of the switch is simplicity itself, and is based on the action of a fine control wire, which passes through small lead piping and travels the complete distance from the switch to the burner. The ease with which the gas could be turned on and off was most convincing; it was even demonstrated that by turning the switch part-way it is possible to partially extinguish the light and thus save gas. The piping containing the wire can be carried round obstacles with successive bends, and it is a tribute to the skilful design and workmanship that these do not apparently impede the operation of the device. Lack of constancy and reliability has been a drawback of automatic switching devices in the past. But we are assured that this switch will continue to work safely for long periods. We understand that this new device is in great demand, but that the ingenuity of this firm is by no means exhausted. There may be other novelties to record before very long.



FIG. 20.—The "Southport" Lantern, with direction sign.

*Photo-Electric Control of Public Lamps.*

This exhibition also afforded evidence of the development of automatic-control methods based on light-sensitive devices. At the stall of the General Electric Co. Ltd., the control of a street-lighting unit by means of a photo-electric cell was demonstrated, and a comprehensive display was staged by the Radiovisor Parent Ltd. In Fig. 20 we show the application of their light-sensitive bridge to a public lamp, the unit being either (a) attached to a lamp standard or (b) placed



FIG. 21.—Showing application of the Radiovisor Automatic Lighting Unit to Street Lamps.

under the cowl of a lamp. At the exhibition a lighting unit on a standard was lighted or extinguished by one of the demonstrators, who simulated the action of night by interposing a black cloth! This new device was first experimented with by the Barnes Urban District Council Electricity Works, but we were given to understand that it is now in use in many other districts. There are many other possible applications of these devices, for example in operating luminous signs, railway-carriage lighting, signals, lightships and buoys, etc.



FIG. 1.—Whitehall by night. This thoroughfare has been lighted by the present system of gas lighting for nearly twenty years. Throughout this period there has never been a failure in the general supply of gas to the lamps.

## Public Lighting by Gas

By a Conference Correspondent

**I**F ghosts are allowed within the happy borders of Bournemouth then I saw the astral body of F. A. Winsor hovering above the chair of Mr. J. F. Colquhoun on September 10th, when the conference opened. For was not F. A. Winsor the persistent advocate of public lighting, and did he not triumph when Pall Mall was partially lit by gas in 1807? Even this pioneer, and his brilliant colleague, Samuel Clegg, the illuminating engineer, could not have foreseen the developments which have since taken place, and their opponents, who employed cartoons, handbills and public denunciation to destroy their efforts to introduce street lighting by gas would be even more confounded.

Then if the ghosts of pioneers haunted the conference hall at Bournemouth, among them must have been von Bunsen, who invented the Bunsen burner in 1855. It was designed to burn gas and air, and produced a blue, non-luminous, non-sooty flame of intense heat. This invention did much to help the industry and to develop its usefulness to the community.

Since those pioneering days other means of artificial lighting—electricity, acetylene, petrol-air gas, etc.—have been discovered and employed, but gas has gone forward in the general progress.

Some thirty years after the invention of the Bunsen burner prophets foretold the doom of gas as an illuminant and the reign of electricity. Robert Louis Stevenson, indeed, wrote a plea for their retention. He need have had no fear, for about this time von Welsbach, a former pupil of von Bunsen, discovered the principle of the incandescent mantle. Surely he should have joined the throng at Bournemouth. By 1890 Welsbach mantles were in common use, and a long series of improvements—the introduction of inverted mantles among them—served rapidly to re-establish the use of gas as an illuminant.

As an instance of progress, it is interesting to note that it has been estimated that the original gas burners in Pall Mall yielded little more than 3 candle-power each, but to-day the high-pressure gas lamps in the same thoroughfare produce several thousand candle power!

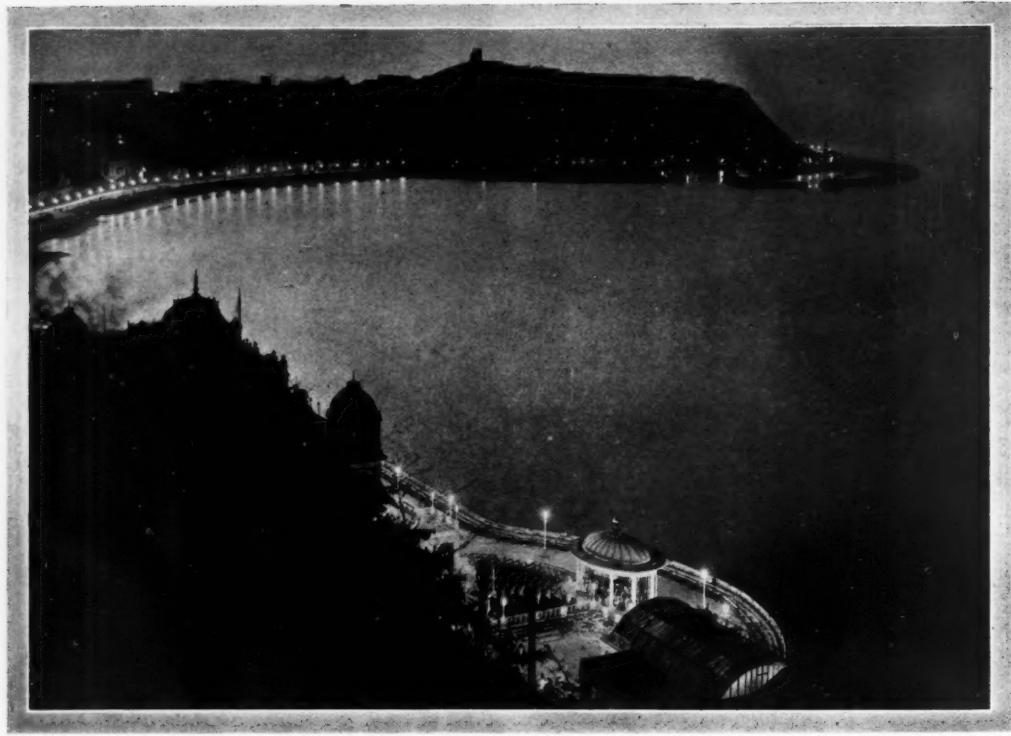
While technical improvements have been taking place in public lighting by gas the advance in knowledge of

the correct methods for getting the best value for lighting has been achieved through the important research work of the gas industry and the Illuminating Engineering Society. Lighting experts have given their knowledge and experience to the general public, and the well-lighted streets of our cities are the outcome of their efforts.

There is a tendency to consider that the use of gas as a public illuminant is declining, and therefore the recently published statistics of the Board of Trade are



FIG. 2.—This photographic study of the Cenotaph on a wintry night appeared recently in the public press. Against the brilliant whiteness of the snow the light-grey surface of the Cenotaph obviously stands out rather darkly. The view shown at the head of the page gives a better impression of the different tone values of the Cenotaph, buildings and road as normally seen by anyone passing along Whitehall at night time.



["The Times" Photograph.]

FIG. 3.—This beautiful view of the South Bay of Scarborough at night recently appeared in *The Times*. Almost every light to be seen in the picture is a gas lamp, Scarborough's promenades and streets being lighted throughout by gas.

of particular interest. The figures relate to all the gas undertakings in Great Britain, and show that the total amount of gas sold for public lamps in this country during 1928 reached a record figure of 10,499,430,000 cubic feet, as against a total of 6,928,745,000 cubic feet in 1920.

Among the several advantages of gas lighting is that of reliability, an example of which is to hand at Whitehall, which has been lit by the present system of high-pressure gas lighting for nearly twenty years. Throughout this period there has never been a failure in the general supply of gas to these lamps. Gas, again, has exceptional fog-penetrating powers, and this quality is of particular value when a gloomy fog descends in winter months.

London, as the "heart of the Empire," and as the greatest city of the world, must always light her streets adequately, and gas, chosen on its merits, is exclusively employed. In Greater London nearly 100,000 gas street lamps are used. Not only are London's multitude of suburban and other streets of secondary importance mostly lit by gas, but the "show places" are also so illuminated. I have mentioned Whitehall, but Parliament Square and the precincts of the Houses of Parliament, Trafalgar Square, Victoria Street, Regent Street, and the courtyard of Buckingham Palace, among other important places and thoroughfares, are illuminated by gas.

Some details of street lighting in such an important residential area as South Kensington should be of interest to illuminating engineers. Circular low-pressure superheater gas lamps with clusters of four medium-size mantles are used in Prince Consort Road, South Kensington. Each lamp consumes eight cubic feet of gas per hour, and gives a light of about 240 candle-power. The road is about 1,120 feet long and 50 feet wide from kerb to kerb. It is 73 feet wide from building line to building line. There are 37 lamps, which are placed about 12 inches inside the kerb and are "staggered." The average distance between the lamp on one side of the road and the next one to it on the other side is 61 feet. The mantles are 11 ft. 6 ins. above the pavement level.

Photometric readings on road level give a good indication of the even distribution of light. On the footway, centre of path, by lamp, it is 1.07 foot candles. In

the centre of the road, opposite a lamp, it is 0.14 foot-candle. On the kerb, midway between the lamps on the same side of the road, the measurement is 0.11 foot-candle. The same amount was registered in the centre of the road between two lamps.

Although private, and not public streets, the thoroughfares in the Peabody Estate at Hammersmith are illuminated by gas. Circular gas lanterns are used, each with a superheater and one medium-size mantle. Each lamp consumes 2½ cubic feet of gas per hour, and gives a light of 60 candle-power. The lamps are lighted and extinguished by clockwork controls.

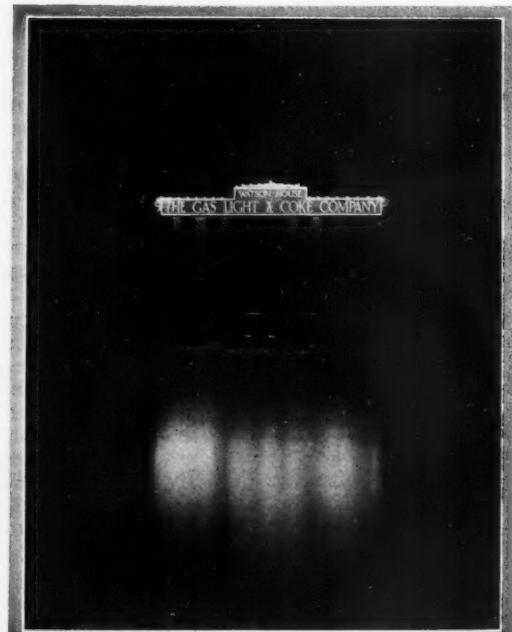


FIG. 4.—The riverside fascia of Watson House of the Gas Light and Coke Company is 110 feet long, 7 feet in height at the two ends, and 12 feet in the middle. It is illuminated by eight 9-light and nineteen 7-light gas lamps, with distance controls which make it possible to light and extinguish the lamps individually, in groups, or all at once. The lamps collectively give 20,000 candle-power.

FIG. 5.—Gas lights this private thoroughfare in the Peabody Estate at Hammersmith. The staircase lighting of the flats is also by gas. On each landing is fixed a small "back" lamp turned on and off automatically by a clockwork controller, of which there are two to each staircase. One controls the lights on the first to fourth floor landings, and the other the light on the ground floor. All lights are turned on at lighting-up time. The first to fourth floor lights are extinguished at midnight, but the ground floor light remains on until sunrise.



An interesting example of modern public lighting by gas is provided by the telephone kiosks which are now established throughout London. As they provide an all-night service, particular attention has been paid to the lighting arrangements. When gas is used, the lighting unit is a specially designed incandescent burner of medium size. This is fixed in the dome of the kiosk, with its mantle in the centre of a circular opening in the roof. A silica-ware globe, protected by a wire guard, diffuses the light. A controller is provided, operated by clockwork, which automatically turns the light on and off at the usual times fixed for street lamps.

In the provinces particular attention is being paid to the use of gas for public lighting. A striking instance was provided recently in *The Times* by the reproduction of a photograph of the South Bay of Scarborough at night, with the famous spa in the foreground. The point of special interest to illuminating engineers is that nearly every light visible in this picture was a gas lamp, for all the public lighting in the famous seaside resort is by gas.

Sheffield is another city in which gas lighting is extensively used. In a paper on "The Lighting of Sheffield," read a short time ago before the local Rotary Club, the lecturer pointed out that there had been considerable activity in the lighting of Sheffield during the past five years. The total increase in lamps throughout the city during those five years was 6,092, of which 3,632 were gas lamps. Clock controllers for automatic lighting and extinguishing have now been installed in 5,576 of Sheffield's gas lamps.

An important point for engineers to remember when considering their illuminating problems is that every street which has gas mains laid in it can be lighted in the most up-to-date manner. If the street is not properly lighted the lamps and burners in use are either obsolete, inadequate in candle-power, badly distributed, or of the wrong height. These are all defects that can be remedied at a reasonable cost. The city or town with properly distributed gas lamps of modern design and of adequate candle-power need fear no comparisons with towns lighted by other methods.



FIG. 6.—This avenue on the Peabody Estate at Hammersmith is lighted by circular gas lanterns, each with a superheater and one medium-size mantle. Each lamp consumes 2½ cubic feet of gas per hour and gives a light of 60 candle-power. The lamps are lighted and extinguished by clockwork controls. Gas is used for lighting throughout all of the 284 flats and 26 six-roomed cottages comprising the estate, as well as for lighting the communal washhouses, drying rooms and baths.

## Modern Electric Lamps

(Contributed by the E.L.M.A. Lighting Service Bureau.)

**I**N December of last year, at the Institution of Electrical Engineers, the jubilee of the invention of the first practical electric lamp was celebrated. This invention was made by the great British experimentalist Sir Joseph Swan, and such was the value of his discovery that very shortly afterwards one or two progressive theatres in London and several notable public buildings in the provinces were electrically lighted for the first time. The ability to obtain artificial light without the presence of a naked flame was such an entire revelation that public interest was quickly aroused concerning the possibilities and convenience of this new form of light. Electric generating stations were set up all over the country, with the sole purpose of providing electricity for lighting homes, factories, offices, streets, etc., with the carbon lamps which Swan, and about the same period Edison, gave to the world.

Swan's original carbon lamp is at present housed in the National Science Museum at South Kensington, where it serves to record a wonderful achievement.

Since that day many improvements have taken place in the production of better and more efficient electric lamps. Scientists and workers all over the world have contributed to the wonderful advancements which have since been made. First of all, it was found possible to considerably improve the efficiency of the carbon lamp itself, and the safe, fumeless light of the carbon type, which could be controlled from a distance, was used in all earlier electric lighting installations. This type of lamp held the field some 25 years, when it was superseded by the metal-filament lamp.

**The Metal Filament Lamp.**—A veritable romance surrounds the development of the electric lamp. At the conclusion of the last century scientists all the world over were endeavouring to find a substitute for the carbon filament, which would enable a bright and efficient lamp to be obtained which did not blacken unduly during the course of its life. It was known that only metals of very high melting-point which could endure a high temperature would survive the intense heat at which lamp filaments were operated. The first practical metal lamp employed a filament of the rare metal tantalum, and operated at an efficiency much higher than that of the carbon lamp. Later, a filament made of tungsten was evolved for use in electric lamps, and was found to be much more suitable than any other material, both on the score of its strength and its ability to give more light for a given amount of electrical energy consumed. The more efficient the electric lamp the more popular electric lighting became; so much so that in these days no progressive shopkeeper is satisfied unless electric lighting is installed, and, wherever

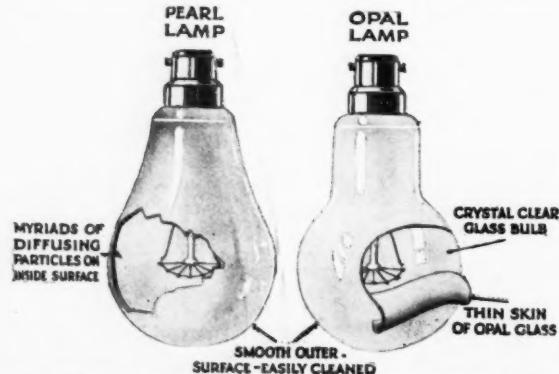


FIG. 1.—Constructional features of "Pearl" and "Opal" lamps. These glareless lamps are designed to replace clear lamps of the vacuum and gasfilled type under all conditions.

possible, the housewife insists on electric lighting not only on the score of its brilliant light but also its cleanliness and hygienic qualities.

**The Gasfilled Lamp.**—A further great advance in the production of light took place with the introduction of the gasfilled lamp. With the gasfilled principle it



FIG. 2.—The diffusion of light from the "Pearl" lamp does not involve an appreciable loss in lighting intensity. This illustration shows that the "Pearl" lamp bulb transmits almost all the light emitted by the filament. The letters behind the "Pearl" lamp bulb stand out as clearly as the other letters on the card.

is possible to produce a very much brighter lamp, and one giving considerably more light than is obtained from a vacuum lamp of the same size.

On account of these distinct advantages gasfilled lamps have been almost universally adopted for all lighting purposes, and have materially contributed towards ensuring that electric light is cheap and abundant and within the reach of all.

**Glare and Gloom.**—It will be gathered that so far the major activities of lamp manufacturers have been towards producing more and more efficient lamps, that is to say electric lamps which will give more light for a given amount of electrical energy consumed. This improvement in efficiency has invariably been achieved by operating the filament of a lamp at a higher temperature, and, as a result, with each new development, the brilliance of the lamp filament has increased until with the gasfilled lamp an intensely bright filament is obtained.

When the filament is entirely screened from view full advantage can be taken of the vastly greater efficiency of the modern electric lamp, but in the majority of instances it is possible in the shop, in the factory, the home, the school, the street, and in fact every field of lighting, for the eye to catch sight of the extremely bright filament of the vacuum and gasfilled lamps of to-day. The result is inevitable. We are conscious of glare. The bright light sources cause discomfort to the eyes, and frequently discount the advantages of the greater amount of light which we have available. The eye is designed to function most efficiently under the high intensities of light received during the daytime, and would operate with equal efficiency at night under similar intensities of electric light, if only glare were eliminated. Indeed, gloom and glare represent the twin defects of a large number of electric-lighting installations. Gloomy lighting is nowadays inexcusable, because electric lighting is now vastly cheaper than ever before. The cost of electricity for lighting purposes has fallen by no less than 38 per cent. during the last five years, while electric lamps now cost only 48 per cent. of their 1920 price. Gloom can therefore be abolished by providing more light at but very little extra cost, while glare becomes largely a question of adequately screening the bright filament of the lamp, either by enclosing

it in diffusing fittings or by the use of the recently introduced glareless lamps.

*Glareless Lamps.*—Many efforts have been made to produce glareless lamps by providing the bulb with a diffusing medium. In earlier attempts the outside of the bulb was frosted, and this largely achieved the desired result. In other instances the bulbs were formed of thick opal glass.

#### HOURS BURNING FOR ONE UNIT OF ELECTRICITY

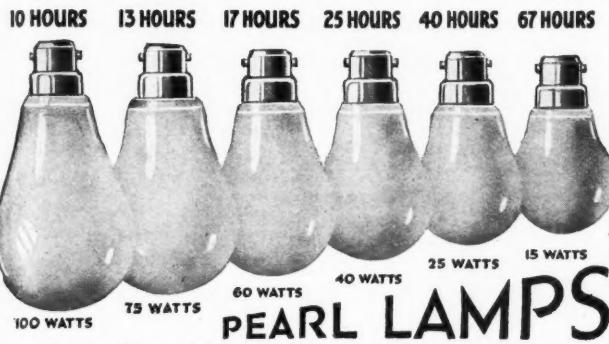


FIG. 3.—Range of "Pearl" lamps available in general use.

In the case of the outside frosting, while fairly efficient when clean and new, the light output of the lamp very rapidly deteriorated, due to the accumulation of dirt and dust on the exterior, while in the case of the old opal lamps the loss of light was considerable.

The new "Pearl" and "Opal" lamps represent a great step forward from every point of view. The "Pearl" lamp, sometimes called the inside-frosted lamp, is ingeniously constructed, with the frosting on the inside of the bulb, where it not only performs its function more efficiently but enables the outside of the bulb to remain smooth and clean. The glareless quality of the light from this type of lamp is such that Sir W. Arbuthnot-Lane, Bart., C.B., President of the New Health Society, states with reference to "Pearl" lamps:—

"Another type of lamp which greatly impressed me is what is termed 'internally frosted' . . . they cannot but do a great deal to mitigate the evils of eyestrain and many kindred nervous affections due to glaring lights. To the writer and student, the patient in the hospital ward, the housewife, and everybody else they will prove a great boon."

*Opal Lamp.*—No less wonderful is the diffusing quality of the light emitted by the modern opal lamp. The diffusion is so great that the whole bulb glows at an even brightness and appears to become the source of light. This great diffusion is brought about by a thin skin of opal glass superimposed upon an otherwise crystal-clear glass bulb. The smooth glossy outer surface of this lamp reduces the possibility of dust collection to a minimum, and cleaning, when necessary, can be easily effected by the use of a damp cloth, restoring the light output to normal.

Contrary to general anticipations, the anti-glare qualities of the "Pearl" and "Opal" lamps do not involve any great sacrifice in light. As a matter of fact, the "Pearl" lamp has the wonderful efficiency of 98 per cent. of the clear lamp, while the diffusing prospects of both the "Pearl" and "Opal" lamp do not in any way interfere with the mechanical strength of the lamp; the bulbs of both "Pearl" and "Opal" lamps remain equal in strength to clear lamps, and are capable of resisting all normal shocks.

*Price.*—The following details refer to the smaller size of "Pearl" and "Opal" lamps which are now available. The wattage of the lamps is an index, not only of their current consumption but also approximately an index of the light-giving property, and it will be noted that there are one or two new sizes which lamp manufacturers feel sure will meet with great approval from the general public.

The standardization brought about by the introduction of these lamps has permitted considerable

reductions in price, and in the case of the "Pearl" lamps, they are marketed at a lower price than the corresponding clear lamps, in spite of the fact that additional works processes are involved. Cheaper and better is, therefore, a true description of the "Pearl" lamp compared with the clear vacuum or gasfilled lamps.

Reductions in price have also recently taken place in the case of "Opal" lamps, so that they are now obtainable at figures well within the reach of all.

The general adoption of "Pearl" and "Opal" lamps to the exclusion of all other types can therefore only result in benefit to the user. The price is right and the light is good, and all who value eyesight preservation will welcome the introduction of these new lamps.

On the general question of electric lamps it is important to bear in mind that electric lamps are designed to give the maximum economy as light producers when operated at the voltage marked on the cap or bulb. It is therefore important to ensure that the voltage of the lamp corresponds with the voltage of the electricity supply mains. If the voltage of the lamp is higher than that of the mains a very inefficient light will be obtained, while, alternatively, if the voltage of the lamp is lower than the mains frequent lamp failures will result.

As some confusion exists as to the cost of operating electric lamps a diagram is given below in which the various sizes of electric lamps are shown, together with the number of hours which they will burn for one unit of electricity. A very simple arithmetical calculation will then enable you to estimate the cost of running any particular size of lamp. For instance, the 40-watt lamp will burn 25 hours for one unit of electricity; now, if the

#### HOURS BURNING FOR ONE UNIT OF ELECTRICITY

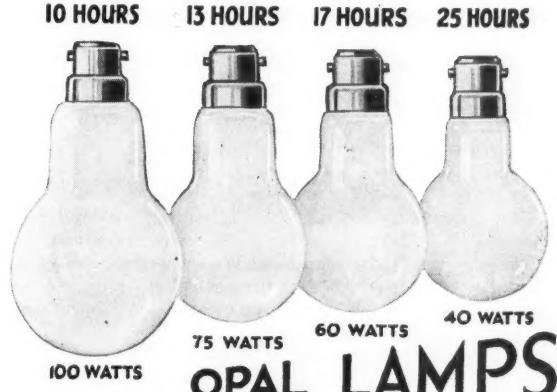


FIG. 4.—The smaller-sized "Opal" lamps available for general use.

cost of electricity for lighting purposes in your area is 6d., then this lamp can be used 25 hours for the cost of 6d., or, in other words, the cost of using this lamp is less than 4d. per hour. If the cost of electricity is more or less than 6d., then the cost of burning the lamp will be varied proportionately, but in any event it will be appreciated from the illustration how cheap electric lighting is at the present time. To whatever purpose it is applied it enables many hours of clean, glareless light to be obtained from the modern "Pearl" and "Opal" lamps at such a small expenditure as to make glareless electric lighting not only desirable and possible, but absolutely indispensable.

"GLARELESS LIGHT PRESERVES THE SIGHT."

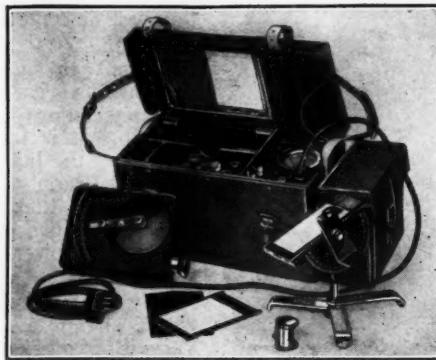
#### PHILIPS LAMPS LTD.—NEW DEPOT AT PLYMOUTH.

We are informed that Messrs. Philips Lamps Ltd. have opened a new depot for the sale of Philips lamps and fittings in Plymouth. The address is as follows: Philips Lamps Ltd., 62, Union Street, Plymouth (Telephone, Plymouth 3323; Telegrams, Phillamps, Plymouth).

TO TEST STREET LIGHTING FOR CONFORMITY  
WITH THE BRITISH STANDARD SPECIFICATION  
**USE**  
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RANGE "A" LUMETER has been specially designed with a long low reading scale for street lighting tests.

This instrument has a direct scale of 0 to 0.2 foot-candles and a secondary scale up to 2.0 foot-candles without the use of neutral filters.



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**Holophane Ltd.** 70, Elverton Street  
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**London, S.W.1**

Telephones: VICTORIA 8062, 3 lines.

#### Holophane Contractors' Conference

A conference held in the lecture theatre of Holophane Ltd. on September 17th was attended by electrical contractors from different parts of the country. An address of welcome was delivered by Mr. H. H. Thompson (Managing Director), who recalled that Holophane Ltd. have been pioneers in conferences of this kind, and have been for many years indentified with the application of scientific principles to illumination. Mr. J. S. Dow (Hon. Secretary of the Illuminating Engineering Society), who had been invited to attend, then said a few words regarding the rapid development of illuminating engineering and emphasized the importance of the work of contractors in carrying into effect the principles of good lighting and in educating consumers to appreciate these principles.

An address by Mr. W. T. Dean on Sales Policy followed, after which Mr. E. Stroud demonstrated and described a great variety of the latest Holophane designs and apparatus. On this occasion a particularly interesting exhibit was the complete assembly of prismatic glass panels of the type designed for the lighting of operating tables. We understand that several installations of this type are now being prepared for London hospitals. Dr. S. English then dealt with the manufacture of Holophane Glass, presenting some striking figures showing the improvement in durability and thermal resistance during recent years, and describing the means by which the glass has been rendered permanently colourless.

After adjournment to St. Ermin's Hotel for luncheon Mr. R. G. Williams gave some effective demonstrations of colour-lighting, and Mr. L. M. Tye discussed Practical Applications of Holophane, by the aid of lantern slides of recent installations. After tea an opportunity was provided for the inspection of the laboratory. The programme was concluded in the evening by dinner at the Criterion Restaurant.

RANGE "B" LUMETER is designed for higher illumination values as found in interior lighting.

The direct scale is from 0 to 20.0 foot-candles and by the use of neutral filters illumination values up to 2,000 foot-candles can be measured.

#### An Exhibition of Advertisements

On the 1st of this month an enterprising exhibition is being opened by the Lord Mayor—the second annual Exhibition of Advertisements organized by the Fleet Street and Advertising Club at their premises at 3, Cursitor Street, London, E.C.4. The exhibition will remain open until October 26th. From the advance catalogue it is evident that firms interested in pictorial advertising will be well represented, and we are interested to see that the Master Sign Makers' Association, who are interesting themselves in the question of improving the quality of illuminated signs, is included. The club numbers amongst its members many of the best-known publicity men in this country, and we trust that the exhibition, which is run in the interests of the club, will be even more successful than the last.

#### The Electrical Association for Women FOURTH ANNUAL CONFERENCE, HELD IN NEWCASTLE-ON-TYNE.

The Electrical Association for Women has, with characteristic enterprise, issued a booklet containing a report of the proceedings at the fourth annual conference held at the North-East Coast Exhibition during July 10th-12th this year. The booklet, which is attractively got up with photos of the various speakers, contains summaries of the addresses of the President (Mrs. Wilfred Ashley) and of the Lady Mayoress of Newcastle-on-Tyne (Mrs. A. W. Lambert). Of special interest is the series of reports by various ladies on electrical developments in the United States (Miss Sophia Malicki and Miss H. Norris), Germany (Fraulein Käthe Böhm), Holland (Mme. E. J. van Waveren and Mme. B. Müller-Lulofs). Finally there is an address on "The Need for Electrical Knowledge" by Dr. S. Z. de Ferranti, who conveyed the regrets of the Rt. Hon. Margaret Bondfield at inability to be present.

## TRADE NOTES AND ANNOUNCEMENTS

### LAMP PUBLICITY CAMPAIGNS.

We have recently received further evidence of intensive activity on the part of the leading lamp companies. Messrs. Siemens Electric Lamps and Supplies Ltd. send us three novelties, the "Popular Pair" lamps showcard, featuring two children bearing on their shoulders Pearl and Opal lamps,



The Philips Small Window Display—Another Attractive Effort.  
an ingenious sign "Siemens" being outlined in translucent amber letters, and a gramophone record of a popular waltz, surely the last word in enterprise! We reproduce a view of the "Popular Pair" lamps showcard herewith.

### CONTRACTS CLOSED.

The following contracts are announced :—

METRO-VICK SUPPLIES LTD. :—

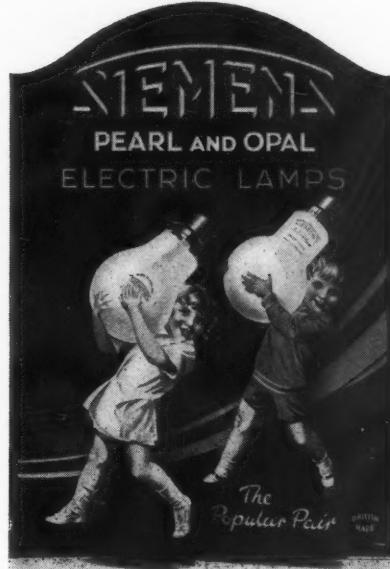
*Parish of St. Leonards;* for six months' supply of electrical goods.

SIEMENS ELECTRIC LAMPS AND SUPPLIES LTD. :—

*Southern Railway;* for twelve months' supply of Siemens electric lamps.

GENERAL ELECTRIC CO. LTD. :—

*Southern Railway;* for twelve months' supply of Osram gasfilled and vacuum lamps; also Osram train-lighting lamps.



The Siemens "Popular Pair" Window Display.

Messrs. Philips Lamps Ltd. are also embarking on an extensive publicity campaign, a novel feature being the maintenance of a staff of expert window-dressers whose services will be available to any trader willing to place his window at the disposal of Philips Lamps Ltd. for a short period. We append a view of an attractive window display, and we have before us a copy of the trade folder, giving prices of Philips standard lamps, which is attractively illustrated in colour.

We have also to acknowledge catalogues of lighting fittings from Metro-Vick Supplies Ltd., Eric Marx, and others.

## BOOKS by Leon Gaster and J. S. Dow

### MODERN ILLUMINANTS AND ILLUMINATING ENGINEERING Second Edition.

This book deals impartially with modern systems of lighting—gas, oil, electricity, and acetylene—and discusses their practical applications. A feature is the variety of illustrations, many of them reproduced from photographs taken entirely by artificial light. The new edition has been brought into conformity with the most modern practice, and forms a complete work of reference.

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IT is the only journal in this country exclusively devoted to Lighting by all Illuminants.

IT receives the assistance of contributors who are leading experts on illumination in this country and abroad. Foreign Notes and News will be a speciality, and correspondents have been appointed in all the chief cities of the world.

THE Journal contains first-hand and authoritative information on all aspects of lighting; it has also been improved and extended by the inclusion of a Popular and Trade Section containing special articles of interest to contractors, gas and electric supply companies, Government Departments and members of the Public.

DISCUSSIONS before the Illuminating Engineering Society which are reproduced in this Journal are participated in alike by experts on illumination and users of light, whose co-operation is specially invited.

*Good Lighting is of interest to everyone.* The Journal is read by engineers, architects, medical men, factory inspectors, managers of factories, educational authorities, public lighting authorities, and large users of light of all kinds.

BESIDES being issued to all members of the Illuminating Engineering Society, the Journal has an independent circulation amongst people interested in lighting in all parts of the world. The new and extended form of the Journal should result in a continual and rapid increase in circulation.

*Every reader of THE ILLUMINATING ENGINEER, the Journal of GOOD LIGHTING, is interested in illumination, and is a possible purchaser of lamps and lighting appliances. Gas and Electricity Supply Undertakings likewise benefit by the movement for Better Lighting, with which the Journal is associated, and which stimulates the demand for all illuminants.*

## JOIN The Illuminating Engineering Society.

Monthly meetings are held, at which interesting papers are read, and discussions on such subjects as the lighting of streets, factories, schools, libraries, shops, etc., and exhibits of new lamps and lighting appliances take place.

Members receive *The Illuminating Engineer*, the official organ of the Society, free.

The Society preserves an impartial platform for the discussion of all illuminants, and invites the co-operation both of experts on illumination and users of light; it includes amongst its members manufacturers, representatives of gas and electric supply companies, architects, medical men, factory inspectors, municipal officers, and many others interested in the use of light in the service of mankind.

## The Centre for Information on Illumination.

*For particulars apply to :*

J. STEWART DOW, Hon. Secretary,  
32, Victoria Street, LONDON, S.W. 1.

